

# 40 Rock **POPULAR** **Computing** 40p **WEEKLY**

3-9 May 1984 Vol 3 No 18

Education special — page 20

**BRITAIN'S BEST-SELLING MICRO WEEKLY****CLASSIFIEDS  
START  
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**★ STAR**  
**Solitaire on Dragon**  
**See page 10**  
**★ GAME**

**News Desk****Philips set the standards**

PHILIPS is negotiating with the French computer manufacturer Thomson to develop a joint standard for European home and business micro-computers.

If agreement can be reached between the two companies then the new Thomson machine — the MO5, announced last week, will become the home computer (eight-bit) standard for the two companies. It is hoped that Philips will then begin manufacture of the MO5, under licence from Thomson.

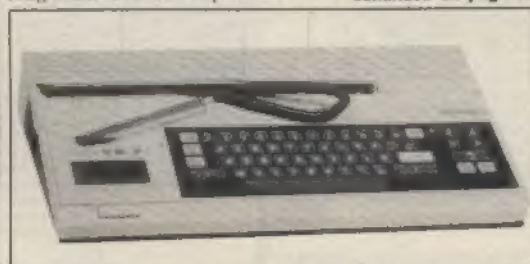
The two firms hope for a long-term relationship in

which a business (16-bit) joint standard could also be established.

Thomson also announced a second home machine last week — the TO7-70. Both the MO5 and the TO7-70 are developments of Thomson's existing home micro, the TO7, which will now be discontinued. All of the machines are based on the 6809E microprocessor chip.

The MO5 is priced at 2390F (around £200). It has 48K Ram, a moving-key keyboard and a single keyword entry Basic included in Rom. It will

continued on page 5



The Thomson TO7 (shown above) is the forerunner of both the new MO5 and the TO7-70 machines

**Commodore presents the C16**

HAVING abandoned plans to sell its 116 machine in Europe, Commodore has announced a new low-cost machine — to be called the C16.

The C16 is intended as a competitor for the Sinclair Spectrum. In appearance it resembles the Commodore 64, using the same case and keyboard. Inside, however, it is more reminiscent of the now dropped 116. It uses the upgraded 6502 processor chip — the 7501, and has 16K Ram and 32K Rom. Included in the Rom is Commodore Basic 3.5.

Screen display is 40 x 25 characters. Up to 121 colours can be selected with a graphics (not colour) resolution of 320 x 200 pixels. The C16 has twin sound generators — either two music or one music and one white-noise channel.

The new machine will be shown at this year's Commodore Computer Show held from June 7 to 9 at Novotel (formerly the Cunard Hotel) in London.

Commodore's other new machine, the 264 — now renamed the Commodore Plus 4 — will also be at the show.

**This Week**

● **Street Life** David Kelly meets Chris Hall, whose company, Locomotive Software, wrote the Rom for the

Amstrad. See page 13. ● **Education Special** A new series beginning with a look at educational programs for

Spectrum and Dragon on page 20. ● **Commodore 64** Paul Irvin presents a musical synthesiser program on page

36. ● **Arcade Avenue** Tony Kendal kicks off a new feature for arcade addicts. Page 43. ● **New Releases**

Included in this week's reviews are 3D Tankzone from Dynabyte and The Greedy Dwarf from Goldstar.



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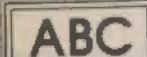
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### How to submit articles

Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

### Accuracy

*Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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## Editorial

Silicon Valley enjoys an enviable reputation, both in the US and in the rest of the world. It is a haven for bright young entrepreneurs, budding venture capitalists and engineers of all description.

The 25 mile strip, which runs just south of San Francisco from Palo Alto to San Jose, is littered with famous names. Atari, Apple, IBM, Hewlett-Packard, Intel and National Semiconductor are just a few of the companies which rub shoulders in the high-tech 'Valley'.

Unfortunately, there is no exact UK equivalent. Cambridge is perhaps the closest to a 'Silicon City', with companies such as Acorn, Sinclair and Computers. But, manufacturing and assembly plants tend to be located further afield, eg. Timex in Dundee.

Software companies are distributed throughout the country — Psion in London, Quicksilver in Southampton, Bug-Byte, Imagine and Software Projects in Liverpool.

Even Sir Clive Sinclair's much vaunted Metalab will not cover quite the same range of high technology industries as exist in Silicon Valley.

Acorn, however, has made the best of both worlds by opening its own research facility in Silicon Valley (PCW 1-7 March). Unfortunately, Acorn is unwilling to talk about its latest US venture. Perhaps Acorn is afraid of Silicon Moles?

● PCW goes up in price from 35p to 40p today. This is the first increase in two years.

## Next Thursday

Next week's star game is Othello — for 16/48K Spectrum by Paul Reynolds.

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## Optical discs from Acorn and BSR

ACORN Computers and audio products company BSR International have set up a partnership to develop optical discs for computers.

The joint venture company called Optical Information Systems will produce the disc drives which read the stored information in a similar way to present video disc players by means of a laser.

"This is an up and coming technology," said Acorn director Andy Hopper. "At the moment it is a speculative venture but if it works well, we'll certainly start taking it

seriously."

The advantage of an optical disc system over a more conventional magnetic disc is its considerably enhanced storage capacity. Development of magnetic media has now almost reached its limit and manufacturers are looking to other types of storage for the next generation of disc units.

Production of the optical drive is expected to start at the beginning of 1985 in Hong Kong, but the optical discs themselves will probably not be available for a couple of years.

## Philips

4 continued from page 1

run both cassette and Rom cartridge software.

The TO7-70 is more expensive at 3500F (£300). It has 64K Ram — expandable to 128K, a professional quality keyboard and a built-in quality keyboard and a built-in cassette player. Unlike the MOS, Basic must be loaded from cassette. Also unlike the MOS, the machine is software compatible with its predecessor, the TO7.

The MOS is to play a similar role in France as the BBC machine did over here. It will be used as the basis for a tv series to be broadcast nationally in October. By then it is hoped some 40,000 machines will have been manufactured.

Philips is very keen to make an entry into the home computer market. In recent months its name has been linked with two other companies in connection with possible joint ventures — Atari and Microsoft (for an MSX machine).

## A portable Apple

APPLE has introduced a portable version of the long-standing IIe computer.

The new version will be called the IIc, and is aimed at 'serious home users'. Apple is keen to distinguish these from those who primarily play video

## A strategic Empire

EMPIRES is a strategy game with a difference, for the 48K Spectrum.

The game is for four Spectrum players, and comes complete with four cassettes. Three users actually play the game, the fourth acting as an umpire.

The three are each leaders of a galactic race whose aim is to wipe out the other races to gain supreme control. Each plays separately and, after each move, players return their saved data to the umpire. The moves are then analysed by the umpire's program and the data for the new positions is then saved and returned to the players for the next move.

Empires costs £19.95. Details from Imperial Software, 153 Churchill Road, Parkstone, Poole, Dorset.

games.

The IIc's software will be compatible with that of the IIe in that it will be able to use about 90 per cent of its software.

The IIc will cost \$1,295 (about £900) — this includes a floppy disc drive in addition to the micro itself. It has 128K of memory, twice that of the IIe.

As well as the machine itself, Apple has also launched a set of peripherals for the machine — a colour printer priced at \$299 (£212), a high-resolution black-and-white monitor for 80 column display, a mouse cursor device, external disc drive and a carrying case.

## Monopoly money for Leisure

LEISURE Genius, the computer board-game specialist, has signed an agreement with Waddington to produce a micro version of *Monopoly*.



Peter Deutsch

"Our initial plans are to produce the game for Commodore 64 and Spectrum," said Peter Deutsch, managing director of Leisure Genius. "But the Amstrad seems to be making a big impact, and Adv-

ance machine sounds excellent too.

"We would expect to see a *Monopoly* program out in July, although it's very early days yet. At the moment we're concentrating on getting our *Scrabble*, *Cluedo* and *Mastermind* games for Commodore 64 in the shops for May."

The onus for protecting *Monopoly* from unlicensed versions of the game still falls ultimately to Waddington, which has in the past taken action against a number of companies.

## Queen's award for Acorn

A Queen's Award for Technological Achievement has been won by Acorn Computers, for its BBC microcomputer system.

The Award praises the "advanced design" and "innovative features" of the BBC micro.

Chris Curry, managing director of Acorn Computers, said, "It is a special honour for Acorn."

## QL reaches the outside world

FIRST deliveries of the QL should by now have reached some customers.

The initial batch of machines — around 1000 — should be going out all this week and it is hoped that all customers who received letters from Sinclair indicating an April delivery should get their QLs before the weekend.

The number of machines being sent out will steadily increase and Sinclair hopes to clear its current backlog of more than 13,000 orders by mid-July.

Two working QL machines made an appearance at the 11th ZX Microfair held last weekend at Alexandra Palace, attracting big crowds.

● PCW's QL order: Week 15. Still no sign.

## Correction

● Pengwyn for the Amstrad micro is being developed by Postern. The game was incorrectly attributed to Ocean in PCW, April 19.

## Who's for tennis?

PSION's next release will be *Tennis* for the 48K Spectrum, scheduled for late-May, well in time for Wimbledon.

You play against the computer and view the game from your end of the court facing the net and your computer generated opponent.

Commented Psion's managing director David Potter, "I predict that nobody will be watching Wimbledon this year — they'll all be playing Psion *Tennis*!"

## Modulator design for ABM

THE Acorn Business Machine — Acorn's entry into the business micro market — will feature a modular design, much like the BBC machine.

"The ABM will almost certainly have a number of dual processor options" explained an Acorn spokesman.

A 6502 second processor option is planned. "The ABM will be able to be configured in such a way that it will run BBC Basic. That may not be its normal mode of operation, but the potential for compatibility with BBC micro software will be there for those who want it."

The ABM is expected to be announced later this year.



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# Letters

## Satisfied customer

My son takes your magazine *Popular Computing Weekly* and has done so since it was first published.

In January of this year, he experienced some difficulty with his ZX81 Printer, using it with an adaptor link up to his BBC Computer. After approaching various electronic engineers, with no satisfaction from any, my son asked me to get in touch with a company advertised in your magazine, Advanced Digital Systems Ltd, of Portsmouth, which supplied the adaptor.

This company deserves to get on; the after sales service (re the adaptor) plus advice and repairs done on a ZX Power Pack, ZX Printer and 16K Ram Pack (Sinclair did not even reply to letters) were attended to without hesitation. Advanced Digital Systems Ltd acted above and beyond the call of duty — Well Done!

I would appreciate it if you would print this on your letters page; maybe somebody else might be glad to know of a company who, without doubt, goes to any length to satisfy the customer.

Marcus Ley  
43 Somers Road  
North Reddish  
Stockport SK5 6SL

## Word package

I am writing in answer to S Guerqueb's letter in Peek and Poke in issue no 15 Vol 3 of *Popular Computing Weekly*, regarding the use of a Brother personal printer/typewriter with a Spectrum. It is in fact possible to put together a word processing package using the Brother EP22 printer/typewriter, a Tasman RS232 interface and Tasword Two for around two hundred pounds.

The Brother EP22 uses two ways of printing, on plain paper using ink cassettes, or on thermal paper. At the moment I do not know the cost of replacement cassettes or thermal paper. To save thermal A4 paper supplied, I have used the

thermal paper from an Alpha-com 32 printer and this works fine. The EP22 has many excellent features besides the fact that it can double as a printer and is extremely portable, working off batteries or mains.

To connect it to a Spectrum all that is required is a Tasman RS232 interface, which plugs straight into the computer and has a lead which connects to the Brother EP22. Software is supplied to configure to various printers and the interface works well with Tasword Two Word processor.

The RS232 Interface and Tasword Two are available from Tasman Software and the Brother EP22 is available from Micro Research, Livingston.

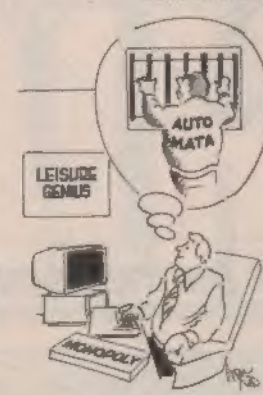
Iain Ferguson  
18 Gorsebank  
Ladywell  
Livingston  
West Lothian

## Screen clearance

I own a Vic 20, and I have two programming tips for your readers. 1) To prevent people from breaking into your programs, *Poke 788,194* followed by *Poke 808,100*.

2) When saving programs, if you type *Save program name*, on loading, the screen will be cleared when the program is found, thus giving a professional effect (the symbol before 'program name' is obtained by *Shift/Ctrl*).

Carl Pickin  
Lenvens  
Tunstal Road  
Knypersley  
Stoke-on-Trent



## A strange anomaly

I am writing to report a strange anomaly concerning the loading of tapes on my ZX Spectrum (or, it seems, any micro with an external power supply).

A friend informed me of problems he had loading games into his Commodore 64, and he found that by placing the power supply away from the tv set and not next to it as he had done, the tapes would load with no problem. As I had much the same set up, I tried the same procedure and found that *Valhalla*, which I had no end of trouble getting to load, went in first time.

The only explanation I can think of may be that some sort of feedback or interference is affecting the power supply and forming a loop back to the computer.

I hope that this information is of some use to anyone having loading problems.

D McRiner  
Dhahran  
Saudi Arabia

## Compatible programs

I would like to take this opportunity to inform your readers that there are two types of ZX Spectrum software.

- a) That which is compatible with the ZX Microdrive.
- b) That which is *not*, i.e. that which requires complex manipulation of code to overcome the incompatibility obstacle.

Please advise your software reviewers to bear the above in mind when reviewing new programs within the columns of your excellent weekly.

There must be thousands of ZX Spectrum users who no longer run incompatible programs in favour of programs that are compatible, i.e. those which may be *Saved* and *Loaded* onto Microdrive cartridges.

Likewise, there must be vast quantities of unsold material due to lack of information in compatibility and the attendant risk of a purchase being incompatible.

In the naive hope that this letter will stimulate reaction, I hope that you will prompt and advise your advertisers to comment on compatibility.

David Lowe  
31 Hill View Road  
Rotherham

## Biological theme

Please could you send me any information on whether there is any software firm that offers a biology game. I ask because my biology project for the term is 'Design a biological game' for which I thought a computer game would be suitable.

My computer is a Sinclair Spectrum (48K). However, my school also has Apple IIs and BBC micros.

I look forward to hearing from you.

Timothy Andrews  
Inver Cottage  
Maple Walk  
Cooden  
Sussex

The most obvious game would be *Life*, which simulates the growth of cells over a number of generations. Numerous listings have been published in various computer magazines over the past two years.

## Missing hex loader

I have a question about an article in your magazine dated 12-18 April. On pages 26-27 you have a hex code listing to make your spectrum simulate an organ — something I have been looking for for a long time.

However the notes tell us to type in the hex loader — where is it? As I am new to machine code I do not know how to poke it in. Can you help?

Gary Joyce  
48 Princess Drive  
Sandbach  
Cheshire  
CW11 9BP

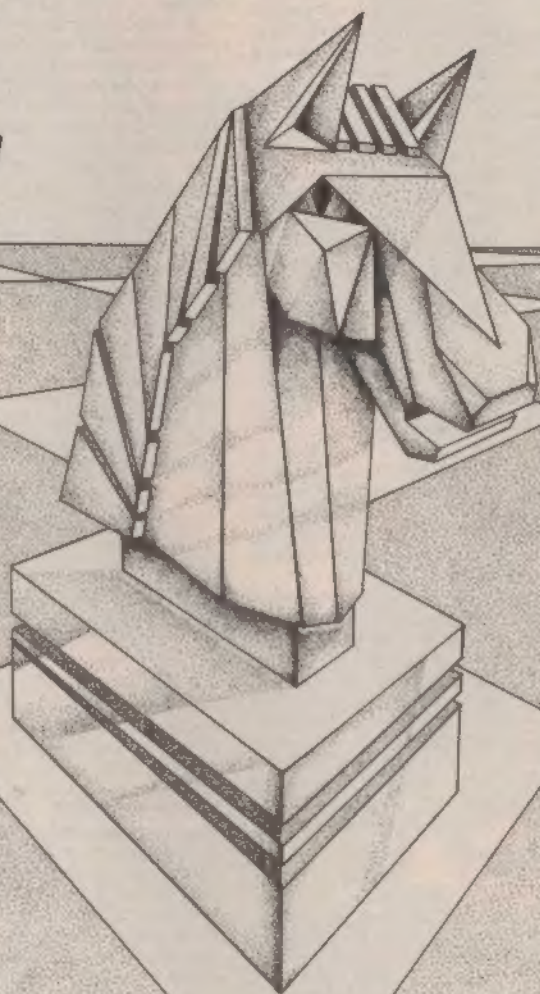
The missing hex loader seems to have baffled quite a few people. In fact Mark Lawrence's series, of which the Organ was only part, utilises the same hex loader for every section — the one printed in the first part, issue dated 5-11 April.



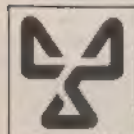
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**GAME  
OF THE YEAR  
BMA'84**



# VALHALLA

SOON FOR COMMODORE 64



# Solitaire

A new game for Dragon 32 by J D Bateman

This game is played in the same way as the standard Solitaire with pegs or marbles. Each piece can be jumped over an adjacent one in an empty hole immediately beyond. The piece that is jumped over is then removed from the board. The object of the game is to finish with just one

piece remaining in the centre space.

## Program Notes

All lower case letters are inverse characters. The colours used are not suitable for a B/W TV, but can be easily changed for ones with a better contrast. All peg positions, vacant holes, etc., are stored in the various Data lines.

Lines 120-280 Set up the board.

Lines 310-840  
Line 850  
Lines 860-710  
Lines 810-1010  
Lines 1040-1130  
Lines 1160-1320  
Line 1330

Input of (moving) peg positions.  
Checks for valid peg location.  
Input direction.  
Show a solution.  
Instructions.  
Check for and print valid moves.  
Checks if final move leaves peg in centre hole.

```
100 * * *
110 * SOLITAIRE *
120 FOR
130 * DRAGON 32 *
140 J. D. BATEMAN
150 * 15/1/84 *
160 * *
170 CLS:PRINT#232,"INSTRUCTIONS Y/N"
180 AS=INKEY$:IF AS="Y" THEN#08
190 IF AS="Y" THEN 1040
200 CLS
210 PRINT#10,"(SOLITAIRE)"
220 FOR X=00 TO 09:PRINT#X,CHR$(255):NEXT
230 FOR Y=101 TO 309 STEP 32:PRINT#Y,CHR
240 $(255):NEXT
250 FOR Z=12 TO 409 STEP 32:PRINT#Z,CHR
260 $(255):NEXT
270 FOR W=42 TO 441:PRINT#W,CHR$(255):
280 NEXT
290 PRINT#100,"a";PRINT#100,"b";PRINT#
300 230,"c";PRINT#202,"d";PRINT#204,"e";P
310 RINT#320,"f";PRINT#358,"g";
```

```
100 POK#1129,49:POK#1131,50:POK#1133,51
110 POK#1135,52:POK#1137,53:POK#1139,54:POK#
120 1141,55
130 U=32
140 PRINT#155,"peg=";PRINT#107,"tell";
150 PRINT#271,CHR$(150);
160 DIM A(32)
170 FOR I=1 TO 32
180 READ A(I)
190 PRINT#6(1),CHR$(205);
200 NEXT I
210 PRINT#219,U;IF U=1 THEN 1230
220 PRINT#440," PEG"
230 INPUT P4
240 SP=0
250 IF P4="D" THEN 240
260 IF P4="A2" OR P4="3A" THEN SP=123
270 IF P4="A4" OR P4="4A" THEN SP=125
280 IF P4="A5" OR P4="5A" THEN SP=127
290 IF P4="B2" OR P4="3B" THEN SP=205
300 IF P4="B4" OR P4="4B" THEN SP=207
310 IF P4="B5" OR P4="5B" THEN SP=209
```









# Code-name Arnold

David Kelly talks to Chris Hall from Locomotive Software

The Amstrad CPC464 is the first home computer Chris Hall has had a hand in designing.

Amstrad began work on their machine almost two years ago. Unfortunately, by August last year it became apparent that there were difficulties with both original system software and the hardware.

So, Amstrad had a keyboard and a case together with a partly finished hardware design based around the 6502 processor. And not much else.

MEJ Electronics was brought in by Amstrad to sort out the hardware design. They, in turn, got in touch with Chris Hall's software house Locomotive (both companies are composed of former Data Recall employees) and both decided to start again from scratch.

The original design was ditched entirely and a new one was created, based around the Z80 processor. This was code named 'Arnold' and became the Amstrad CPC64.

The Z80 suited Amstrad because it gave the machine the possibility of running business software using the CP/M disc system. And it helped Locomotive, which already had experience of the Z80 chip.

Locomotive is a new company set up to develop system software. "We don't do applications or games and we are very interested in speed — our Basic is fast!"

"We literally first heard of the Arnold last August and the three of us — Richard Clayton, Bruce Godden and myself — had a hectic few months." Locomotive actually started writing in September last year and had to work blind for six weeks.

Locomotive and MEJ worked closely on the design. "We had an idea of what price the machine was going to be sold for — which set the parameters for the hardware. We couldn't knock out something 'noddy'. On the other hand, we didn't have time to produce a QL from scratch.

"Before we started we looked at the BBC machine, because at that time we saw it as a market leader, and we also had a look at the Commodore 64.

"We already had our own Basic interpreter for a CP/M80/CP/M86 MSDOS system and the decision to use the Z80 in the Amstrad was driven by the fact that we couldn't possibly have written both the firmware and the Basic in three months.

"There were a number of constraints which came from Amstrad's original thinking — the casing and keyboard and the inclusion of a cassette recorder and monitor. That was all settled and had to be taken on."

"The monitor is a pixel VDU — the simplest sort. When you do the sums you find the Amstrad has to be the way it is. It is a straightforward 16K of memory for the

display — two colours at 640 x 200, four colours at 320 x 200 or 16 colours at 160 x 200. You can 'suck' 16K from Ram just fast enough to refresh the screen.

"The sound uses the GI chip — AY-3-8912. If you look at the number of sound chips there aren't very many and the GI has three channels.

"A Centronics port seemed appropriate, for a printer. Having the built-in cassette player made life easier because its electronics are a bit special.

"Add in a custom gate array and there you have the machine."

The main thrust behind the firmware was to make it as open as possible for other languages and software. "We tried to keep a firm distinction between the firmware and the Basic. The Basic simply takes the commands keyed in, packs them up and passes them to the firmware. The HiSoft Pascal written for the machine, for example, has all the graphics and sound facilities that the Basic does."

Nearly all the features of the machine are implemented in the firmware and Basic. "We wanted to avoid 'magic numbers' in the Basic. The Commodore machine has some very good hardware features but, without Simons' Basic, you have to spend your time 'poking' away with magic numbers. Similarly, we knew we wanted to avoid confusing VDU19-type commands that the BBC suffers from.

"The Arnold is intended to be as easy to program as possible. After all, even an experienced programmer, faced with a series of Pokes to various machine-code addresses written some time ago, may have trouble working out what is going on."

The firmware is written as a series of sub-routines. There are no variable interfaces — no system variables to Poke around with. Everything is written to use routines. For example, the Sound command in Basic picks up the key commands, organises the parameters and picks up the machine-code command Sound Cue in the firmware. All of the machine code sub-routines in the firmware are documented. Amsoft — Amstrad's computer division — will be publishing in full the firmware documentation.

"Anybody writing software for the Amstrad should never need to go near the hardware. The only possible point would be if you want particularly fast and flashy screen routines. In this case we decided that it wasn't appropriate to provide generalised routines."

Software houses writing for the machine have been asked by Amsoft to write using the firmware provided, rather than reinventing the wheel.



One interesting feature of the CPC464 is its use of 'windows'. "We wanted the machine to have separate text and graphics windows." The way it works is to define an area of the screen as, say, a graphics window and then anything plotted outside the area of the window is 'clipped' and not displayed.

"We thought that one text window was a bit mean so we have got eight. The text windows are tied up with the eight text streams. Each stream has its own window, its own cursor, and its own Pen and Paper commands. "You select a stream which you can then write to — and it will then plonk it out in that stream."

Another feature of the machine is its real-time controls. At a machine code level the firmware incorporates a number of hardware interrupts which, linked to an internal timer, can be used to trigger a sub-routine. Frame fly-backs from the screen can also be used to 'kick' a routine.

At the level of Basic two commands are provided: *After (After n Gosub)* which jumps to the subroutine after *n* where *n* is a time in 1/50sec; and *Every (Every n Gosub)* which jumps to the subroutine every *n* — and gives a periodic effect.

Similar mechanisms are also provided for the sound commands. Sound management is all done from the interrupt path so, unlike the Dragon, the processor can carry on processing when a sound is being generated.

With something around 12 weeks to complete the software on the Amstrad, the Locomotive team had to work flat out. The majority of the Basic was already written, but it was rearranged and some new features were added. The firmware was written piecemeal in modules. Each of the five modules (1 sound, 3 screen, 1 keyboard) were fully tested before going on to the next. "We wrote them in a sensible order so that if the fundamental routines took longer to write than we expected then at least we had written them by the time we had to deliver the software to Amstrad!

"We handed over our finished software 14 weeks ago and the machines at the launch had finished Roms in them."

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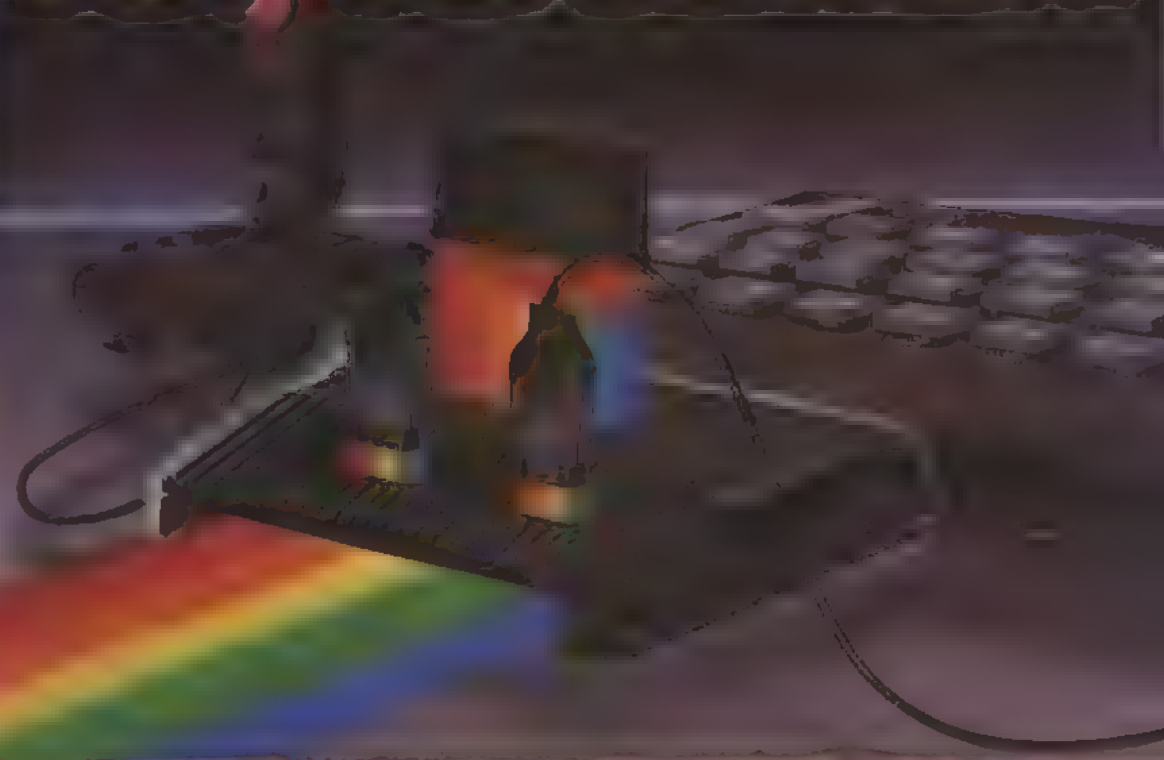
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# A secure future

Gary Thorogood tests his skill and judgement with a selection of games for the Vic20.

With the name of Commodore 64 on everyone's lips (or so it seems), Vic 20 owners may be excused for thinking that they are in the possession of a quaint and ancient relic, the sole function of which is to act as a glorified calculator or as a medium for playing the most primitive arcade-style games. This is not, of course, the case and there appear to be plenty of software houses up and down the country willing to prove that a limited memory counts for less than the unlimited imagination of a talented programmer.

*Space Escort* by Romik Software is a case in point, using the machine's resources to the full. Your task is to accompany 26 space liners to the newly conquered planet of Sistoria. You are given nine fighters to repel the four waves of attack that you will encounter on your mission. Along the journey you will be met by a whole host of weird and wonderful opponents — Space Flies, Xethus Spirals

enough happening on the screen — keep you fully occupied. The game has some interesting control devices allowing you to pause the action at any time should you need to catch your breath and to continue a new game where the previous one left off.

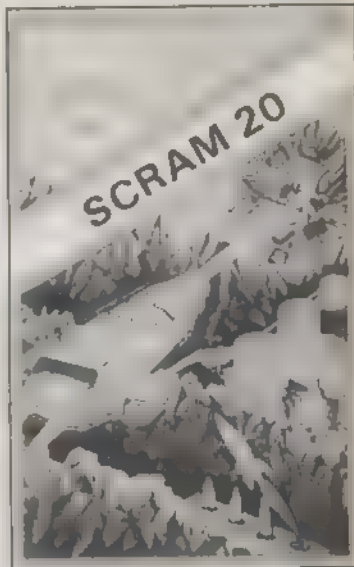
*Scram 20* by Artic Computing Ltd. is another game calling for all your reserves of manual dexterity. You must manoeuvre a spaceship through various hazards in order to destroy the enemy base. Points are amassed for eliminating the numerous obstacles and your fuel supply must be constantly replenished by means of bombing fuel dumps that are scattered along the trail. There are five sections to *Scram 20*, each providing a new and deadlier threat to your survival. The earlier bombs and U.F.O.s may be formidable opponents but your nerve will really be tested by the Zoids and Superzoids lying in wait as you near the base. It is an exciting and demanding game and with live controls to operate, the use of

a joystick is virtually essential.

*Space Snake* by Commodore, although set in the distant heavens, is more technically down-to-earth. With the use of only two keys (up and down) you must guide the snake, or its very rough approximation, between deadly satellite mines and into a number of tunnels containing randomly placed eggs that have to be eaten. As you progress the game becomes faster, the cosmos more littered with mines and the tunnels more winding and treacherous. *Space Snake* is an enjoyable game, mixing a couple of old ideas into a new formula but after a while the game can become rather repetitive.

What *Space Snake* lacks and what *Bengo* by Mr. Micro has in its favour, is a great deal of humour and a way of bringing something fresh to what are, after all, variations on two or three basic formulae. In this game you must move *Bengo* the Eskimo among the dastardly Snow Yeti who are purported to be

half-blind and half-witted. They are not as docile as they sound, however — they can smell a good Eskimo lunch and will chase you in between blocks of ice in order to satisfy their hunger. Your only means of defence is to hurl the blocks across the icy plains and hope to kill the Yeti in the process. It is an enjoyable game and with nine levels of play and a diminishing time factor it calls for quick reflexes and a steady hand. The graphics are colourful (the action is set against the background of the Northern Light) and the intricately detailed



characters are three dimensional. You can play around in the frozen wastes until your heart (or the Yeti's stomach) is content whilst whistling away to the accompanying tune of *Hot Butter*. One point, this excellently packaged cassette can only be played with a joystick.

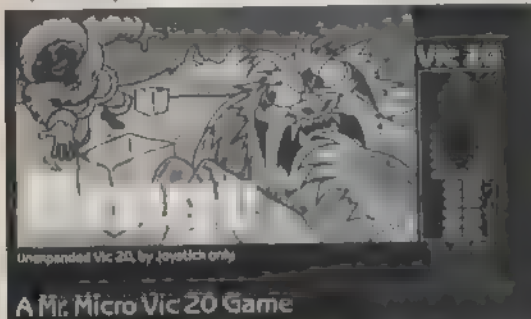
All the games we've looked at so far have been designed for the unexpanded Vic but if you do have an expansion unit, there are programs on the market which cater for a larger memory and which, on the whole, are more ambitious in design and sophisticated in execution.

A good example is *Teddy* by Audiogenic which will need an 8K expansion at least. You are a bear living in the heavily vegetated woods, supplementing your diet (and gaining points) by eating the occasional picnic basket or the pieces of fruit that are dotted about the forest. The tranquility of this Arcadian setting is disturbed by groups of lake snakes hissing venomously as they meander through the trees on your trail. Your only hope is to bite their tails which will kill them. However, if you miss and bite the creature in the middle it will merely sub-



and Giga Kamikazi to name but three. If you are skilful enough to destroy your adversaries, you land safely on the planet and then return to escort the remaining 25 liners. *Space Escort* is a fast moving, action-packed game with bright and colourful graphics, loud and vibrant music and

divide, thereby doubling the threat. The characters are well defined; at each level the snakes become more menacing as they squirm along to the nicely ironic tune of *The Teddy Bear's Picnic*, while the bear looks the epitome of cuddliness and vulnerability. The emphasis is on humour and I think that you'll find *Teddy* an amusing game to play. There is even a Hall Of Fame capability so that you can record the bravest teddy bears in your family.



*Patience* by Commodore requires 3.8 or 16K expansion and is based on the popular parlour game. The object is to place the four suites of cards in ascending order on their respective packs by means of carefully worked out moves. The screen is set out in exactly the same way as the real thing and you have at your disposal all the controls necessary for dealing, moving and placing the cards. *Patience* requires a great deal of thought and planning and can be very rewarding should you succeed in getting all the cards out in the correct order (no two games are alike as the pack is reshuffled after each one).

It is obviously a program for the less adventurous games player but will, I think, involve all the family.

*Commodore Super Games Pack 2* also requires expansion and consists of two cassettes featuring four programs. The first of the four, *Blockit* is based on the principle of noughts and crosses where you have to arrange five rectangular blocks in a row in either a horizontal, vertical or diagonal direction. The computer will try to stop you doing so by placing its own blocks in your path and attempting to build a row of its own. *Blockit* is a slow game but one that requires strategic thought.

*Cannonade* is a game for two players in which you have to destroy the opponent's cannon by firing shells through a hole in the dividing wall. The angle and speed of the shot are pre-determined by the figures you enter into the computer before the game begins. *Cannonade* is, in effect, a variant of *Battleships* and is one of the slowest and most uneventful games I've yet played. Should you have the willpower to continue and actually hit your opponent, then a new game begins with the hole and the cannons resituated.

In *Road Rally* you must drive your car (or to be precise, a string of diamond shapes) along a road, negotiating treacherous bends whilst avoiding the sides of the road. The longer you survive, the greater the points awarded. You can choose the width of the road you require ranging from the virtually impossible to the ridiculously easy.

*Skittles* is the most interesting of the four games included in the package. It may be played with one or two contestants or even

two teams. There are six different formats, each requiring a different degree and type of skill but all are basically variations on the same theme — knocking down more skittles than your opponent. *Skittles* probably has a higher boredom threshold than the other three games but after a few attempts, the experienced games player will be looking for something a bit more mentally and physically taxing. All the programs in the pack are variations on familiar patterns while the graphics are pedestrian and lifeless. They demonstrate little of the imagination shown by many of the independent software

manufacturers.

*Countdown* by Paramount (requiring 11 or 16K expansion) is a good example of this. The plot is so convoluted that space does not permit me to go into any great detail other than to say that your task is to defuse a time bomb and thereby avert a national disaster. Within a very limited time scale you must escape from a house, make your way through the jungle and then ease along a sewer in order to reach your objective. All manner of obstacles must be overcome, including killer security devices, man-eating plants and poisonous tendrils. Along the way you must pick up pieces of gold and purloin four keys so that the bomb can be safely deactivated. There are three levels of skill based on varying time limits and three screens, all very colourful and intricately detailed. *Countdown* will test your resources of skill and ingenuity to the full and like all the best games, will both infuriate and thrill you.

All in all, this collection of puzzles and games is proof enough that the output of software for the Vic 20, whether expanded or unexpanded, has far from diminished in either quantity or quality. There is enough intelligence, wit and originality amongst today's programmers to convince me that the future remains secure. Thanks for the memory 64, but I'll stick to the Vic.

Supplier	Game	Price	Value
Romik Software 272 Argyle Avenue Slough Berks	Space Escort	£5.99	8
Artic Computing Main Street Brandsburton Driffield YO25 8SL	Scram 20	£5.95	7 1/2
Commodore Business Machines 675 Ajax Avenue Slough Trading Estate Slough Berks	Spacesnake	£4.99	6
Mr Micro PO Box 24 Swinton Manchester M27 3AJ	Bengo	£6.90	8
Audiogenic Ltd 39 Sutton Industrial Park London Road Reading Berks	Teddy	£5.95	9
Commodore Business Machines	Patience	£4.99	8 1/2
Commodore Business Machines	Super Games Pack 2	£11.99	4
Paramount Software 67 Bishopston Lane Stockton Cleveland	Countdown	£5.50	10





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Once upon a time, only Commodore owners could experience the thrill of playing an original game by Jeff 'Awesome' Minter. Lesser mortals could only sit and stare in wonderous rapture at the furry arcade action brought to you by Llamasoft.

**BUT NOW THERE IS HOPE.**

Dragon owners were the first to see the light of day, but now Salamander Software is pleased as punch to announce that selected titles **ARE NOW AVAILABLE FOR THE 48K SPECTRUM.**

Yes, that's right. Salamander is now producing titles for the Spectrum, and the first of these are two great arcade games.

## METAGALACTIC LLAMAS BATTLE AT THE EDGE OF TIME

On a forlorn observation post at the edge of the galaxy, the Metallamas see the first sign of Zaxaxian spaceships. Suddenly the alarm claxons blare, and the furry friends of freedom rush to the aid of the only foed that there are no attacking spaceships, and that they are under attack. Cuborg Arachnid Mutants and Disgusting Weeviloids.

This classic arcade game, originally developed by Jeff 'Awesome' Minter of Llamasoft, features 1 and 2 player options, spitting Llamas, Cuborg Arachnid Mutants, Disgusting Weeviloids, 99 levels of play, joystick recommended. Supports Spectrum 2X interface 2. Kempston joysticks.

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Game originally developed by Jeff 'Awesome' Minter of Llamasoft. Joystick recommended. Supports Kempston and AGF joystick interface. In space, only the Camels can hear you scream.

## What some famous people have said:

What's an arcade game?  
Awesome!  
I prefer elephants.  
Don't shoot me. I'm not a chimpanzee player.  
Boing.

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Jeff Minter  
Fannibal  
Elton John  
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This is the start of PCW's Education Special, a series which will run over the next few issues. We will be looking at a selection of educational software for various machines, giving some idea of the state of the market, and the variety of material available.

The series begins with a set for very young children on the Spectrum, and a survey of some educational programs for Dragon 32.

## Buns and bagpipes

Andy Pennell looks at the Learning Box series from Arrow

Learning Box is the title of a range of educational programs recently released for the 48K Spectrum from Arrow. There are eight packages in all, and divide into two distinct sections — four intended for children of three to six years, and four for older children up to the age of eight.

Each program is supplied in a large video-cassette box, with colourful artwork, and look professional. Opening the boxes reveals several items — there is a Story Book, containing, among others, the tales of Hansel & Gretel and Red Riding Hood. There is also a Parents Guide, which explains all the connections required to the Spectrum, how to load the programs, and their use. A very good idea is the inclusion of double-sided keyboard overlays, which simplify the cluttered Spectrum keyboard into a few distinct, coloured areas, so the child does not have to be at keyboard literate. As well as all this there is the cassette itself, containing on one side the program, and on the other Toni Arthur reading the related story. Due to the packaging used, it can be very difficult indeed to remove the cassette from the plastic filler, and I expect most children and many adults could have problems removing it. Each program consists of several exercises, in gradual order of difficulty, which can be done at any speed. They are designed to be used initially by both parent and child, but after a short while the child should be able to do each exercise unaided.

All the programs are written in machine-code, and practically fill the Spectrum memory. They all use lots of colour and sound to keep the children entertained. The graphics in the programs are all excellent, and very large. The graphics that Five Ways (the authors) have put into their programs makes many Spectrum games programs look positively crude, with well drawn colourful shapes. Another nice feature is that when alphanumeric are required, instead of using the Spectrum's character set they have designed their own, which are most at least twice the size of the standard characters, and very nicely formed with true descenders.

Having dealt with their common features, I shall discuss each package in turn, in approximate order of difficulty. *Five Little Ducks* is sub-titled *I Can Count*, and introduces the concepts of sorting, matching and counting objects. It does this by

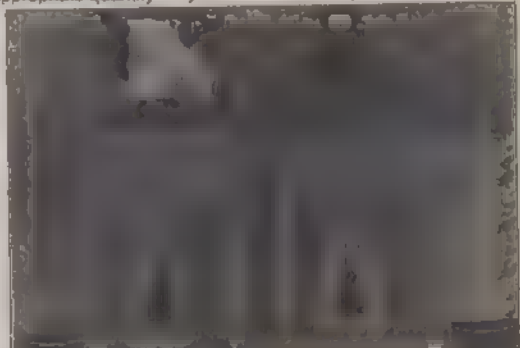
using the ducks of the title, together with some very good 'quack' sound effects and neat graphics to produce ten gradual exercises that should end with the child being able to recognise and understand numbers up to five. The best scene is where various numbers of ducks, wings flapping, fly over a lake before diving in. Even Ultimate would probably be impressed by it!

The follow-on is *Nine Currant Buns* which deals with simple sums. This was my favourite, mainly because of the cutest addition sign I have ever seen — if you think that sounds strange, I shall explain. When an addition is shown on the screen in large digits, below it are the appropriate quantity of objects, and the '+' sign changes into a delightful little man and puts the two piles of objects together. The reaction from all, both young and old who have seen it is the same — "Aaaaah".

The third in the lower age-group section is *Red Riding Hood* which teaches the child to recognise letters and words, preparing him/her for reading. It does this by encouraging the child to match combinations of colours, pictures and words, using characters and objects from the story. In fact, this is really two programs in one, as the parent can switch between *Red Riding Hood* and *Goldilocks*, giving two different vocabularies and sets of pictures. The different games of Snap within the program cleverly adjust their speed to suit the players, so that the attention of the child is maintained whatever their ability. Along similar lines, and following on comes *Goldilocks* which extends the exercises so that the child becomes more familiar with groups of words, then sentences. It uses similar methods to *Red Riding Hood*, and like it has two complete sets of words and pictures. There was one aspect of *Goldilocks* that I thought was not done well enough. A sentence with one or two nouns replaced with pictures appears on the screen, and the child has to choose which

of three words that Goldilocks points to is suitable. When a child makes a correct choice, the picture disappears, and I would like to have seen it remain, along with the word. It's only a minor gripe really, as the rest of the program is just as good as the others.

The first in those for older children up to the age of eight is *Mr Mac's Day*, which helps teach the child the time. It does this using a character called Mr Mac, a train driver, who also seems to be a very natty little dancer in his spare time. The exercises take the child through Mr Mac's busy day, with continual reference to a large, on screen clock, which can be adjusted in five minute intervals. To begin with, there is a stunning animation sequence which starts with Mr Mac climbing out of bed, follows him to work, and then to his Scottish dancing session in the evening. This must be the first and only time a Spectrum has been used to make bagpipe sounds! The graphics in this section just have to be seen to be believed, as they really are cartoon quality. As well as some clever, but fun to do exercises on the normal 12-hour clock, there is one on the Digital Clock, a sign of the times, and another on the 24-hour system. *Mr Mac's Day* is another excellent



Scene from Red Riding Hood

piece of software from Five Ways. Unfortunately the next package, *The Magic Shop* was not as impressive. It is intended to teach the child about money, and the use of the different denominations of coins, but I feel that it does not come up to the very high standard of the others in the series. It is very up to date though, including the 20p and £1 coins, while omitting the 1p, but I found it rather difficult to use, as it didn't seem to put the right sort of information on the screen, particularly the coins the child chooses. This is a shame, as the ideas used, which are based on buying weird objects and make spells, are very good, but the presentation lets it down.

Luckily the next package, *The Enormous Turnip* quickly redeemed Five Ways' reputation, with its exercises to improve spelling skills, and the formation of words from sounds. It effectively uses the characters and events from the story, along with the



Hansel and Gretel

statutory brilliant graphics to do this in a very neat way. The final package under scrutiny is *Hansel and Gretel* which teaches some of the more complex letter combinations, while increasing the child's vocabulary. It contains some quite frighten-

ing graphics, particularly of the Tumble Tree, and more clever animation. Particularly good is the sequence when Gretel pushes the Witch into the oven, rescuing her brother. The final exercise is a Hangman variant, which I found rather difficult at times! If you complete the word in time, you are rescued by your father and "There's no place like Home" is played, but if you fail the tree gets you, and it sounds as if something pretty horrible happens, but you are thankfully spared the graphics.

In conclusion, the programs in the Learn-

ing Box series (with the possible exception of *Magic Shop*) are all excellent, and should entertain most children while educating them very effectively. Those teachers who scoff at the Spectrum in primary schools should see these programs — they would probably sell their Bees to buy a few Spectrums if they did. The only possible area of improvement would be for a Speech option, using perhaps the popular Currah unit, but they still offer a lot of fun and teaching for the reasonable price of £9.95 per package.

Supplier	Program	Age	Price
Arrow	Five Little Ducks	3-6	£9.95
17-21 Conway Street	Nine Currant Buns	3-6	£9.95
London	Red Riding Hood	3-6	£9.95
WIP 6JD	Goldilocks	3-6	£9.95
	Mr Mac's Day	up to 8	£9.95
	The Magic Shop	up to 8	£9.95
	The Enormous Turnip	up to 8	£9.95
	Hansel and Gretel	up to 8	£9.95

## A higher plane

**Kelth and Steven Brain survey a range of programs for Dragon 32**

As the Dragon has never really featured in the 'school micros' fight it is perhaps surprising that the range of 'educational' software for it continues to increase. On the other hand perhaps this is a reflection of the sad fact that it is no good giving every school a micro (of any make) if you don't also give money for software, and that most commercial educational software seems to be bought by 'concerned' parents rather than educational establishments!

Programs concerned with numeracy are common and in this selection we have looked at a number of offerings which are pitched at various age ranges. It is probably fair to say that the difficulties of producing good programs for the very young are minor compared to using the full potential of computer assisted learning for the older child, and that this tends to be reflected in both the number and quality of the material available for the more mature mind. Whilst simple games and pretty colours and sound may impress the average 4-5 year old they do not have the same impact on more cynical 11-16 year olds who are blasé about getting their names onto the high-score table of this month's favourite arcade game.

Ampalsoft's two-cassette *Maths Level One* goes a little further in exploring number relations and gives you a choice of two levels of difficulty. Scores are kept and you can change the sequence of exercises, and number of tries per exercise — although perhaps this is beyond the capabilities of the 4-6 year old, and since the instructions are in small print on a separate card it presupposes that the users can read. One to four children can play at the same time so it can be a group activity, but although there were some nice ideas our overall impress-

ion was that it was rather slow and it would probably need the constant attention of an adult. *Maths Level Two* is a similar two-cassette set from Ampalsoft which moves to a higher plane and includes 19 tests covering addition, subtraction, charts, tens and units, multiplication etc, at various difficulty levels, but which is not very awe-inspiring.

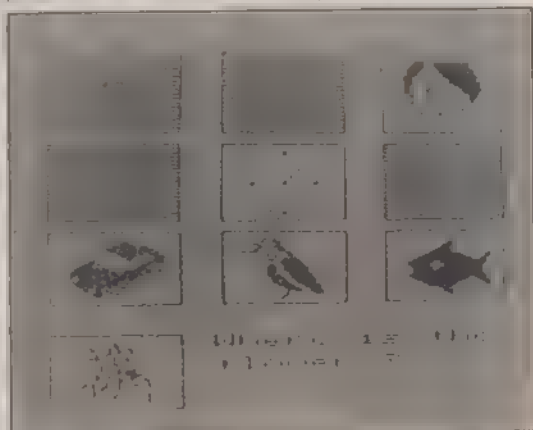
*Number Puzzler* was written for Dragon Data by Applied Systems Knowledge of whom we have already formed a high opinion for some of their other educational programs. We were not disappointed as the program used large upper and lower case, hi-res graphics and sound, very effectively. You have the choice of playing against the computer or another player at a number of games, including a number version of noughts and crosses and 'magic squares'.

*Number Gulper* from the same source was similarly impressive. This is a version of *Pacman* using joysticks or keys in which you have to 'gulp' up the required number of the correct signs to produce the number displayed. The final mathematical program considered was *Maths 'O' Level Revision Part One* from Ampalsoft which gives comprehensive coverage of the typical school syllabus with problems included.

The answers to these problems can be displayed and, if necessary, a more detailed explanation can be called for. It seemed quite useful and it makes a change from doing your set homework, but won't belittle you if you do this instead!

The other major basic skill which must be learnt is the ability to deal with letters and words.

*Words, Words, Words* from Applied Systems Knowledge is versatile and interesting as it offers a series of scenarios such as 'the city', 'the street' and 'the house' from which objects to spell are displayed, and the various sections are well linked together. Another winner from ASK, *Hide and Seek* (ASK again!) consists of two different programs on opposite sides of the cassette which are aimed at helping memory development and early reading. Pictures are displayed and then covered up



ASK's *Hide and Seek* in progress

with shutters and you must match pictures, type in the name of a picture, or find the missing picture. This is certainly one of the best educational programs we've seen.

continued on page 23





# TURTLE SOFT



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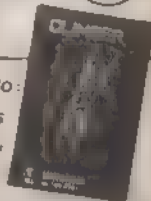
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# Education special

Once the fundamental basics of numbers and letters have been mastered more philosophically demanding areas can be considered. Dragon Data's *Circus Adventure* is designed for children of primary school age and is billed as 'a beginner's adventure game'. It seems that you can only go 'up or down (north or south)' or 'left or right (east or west)' alternately so that you cannot backtrack so progress is rather haphazard, but you are rewarded by pictures (low-res) and music. It is not exactly mind-blowing (and it would perhaps have Tony Bridge in fits of hysterics) but we suppose that everyone has to start somewhere. *School Maze* is a similar program in which you must move around the school looking for a missing computer tape. The least said about this particular tape the better — if we lost it we wouldn't bother to go looking!

Salamander's *Turtle Graphics* promises to be 'a method of drawing pictures with your computer which is both fun and educational, yet simple enough to be enjoyed by the young or inexperienced computer user and the enthusiast alike.' It consists of a tape and a 28 page manual which includes details on how to transfer the program to disc. You can produce pictures by controlling a 'turtle' which moves around the screen according to the traditional 'left', 'right', 'forward' etc commands. Unfortunately, although the pictures are produced on the hi-res screen, the commands are entered on the normal low-res text screen ('command screen'), so

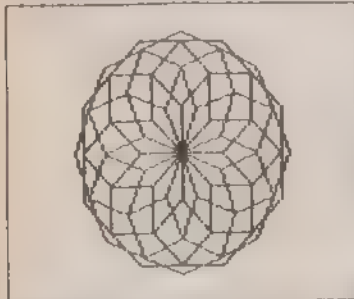
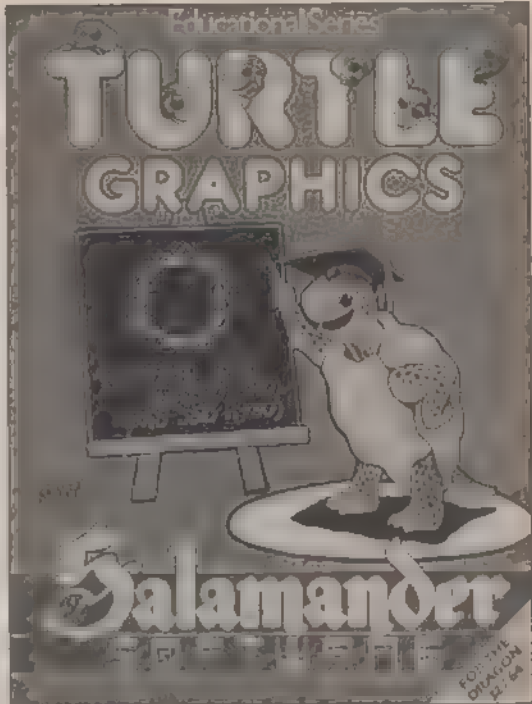
relationships, but we can't help wondering how long the interest would last for the 'not-so-young and inexperienced'.

Computer manuals are infamous for their general inadequacy, inaccuracy or even (dare we say it) incompetence, so it is not perhaps surprising that someone has tried to remedy the situation by producing *Basic Tutorials* which the new user can use to learn new skills and test their own progress. Ampsoft offer both *Beginners* and *Advanced* level packages, each containing two cassettes. The former starts from absolute basics with 'What is a computer?' and continues with 'What is Basic', variables, assignment statements, arithmetic operations, simple input and output, *Print @*, *Goto*, conditional statements and loops. A tutorial section is followed and then you are advised to follow a 'practical' session before continuing. The practical work sets you problems, and you can also look at the 'solution', but it seems a pity that they do not use the computer to check your answers or run demonstrations of the programs. The influence of the 'O' Level Computer Studies course is apparent — but in real life do people always use *End*? The 'Advanced' package covers sound and graphics, subroutines, user functions, arrays and data, string manipulation etc.

Inevitably such programs are on trans-

ferent value, as once you have mastered them you no longer have any need for them (unless, of course, you can persuade one of your friends...). When deciding whether you should buy such programs you should perhaps balance the value of your time, and your other commitments, against the time it takes to unravel the manual.

Since we live in a real world where the cost of the product must depend upon its sales potential, it is probably inevitable that it is difficult for the quality of small-volume educational packages to stand comparison with games, but certainly some of this selection were very impressive, although others left a bit to be desired.



you cannot see what you are doing! This is totally unnecessary as hi-res text screen driver routines are now common and it rather spoils the attraction of the package.

Editing of command lines is good and pictures can be scaled, and coloured. A useful 'library' function is provided which can store up to 30 'words' which define particular movement patterns, which can be saved and used in commands. An option is included which allows you to also simultaneously plot your masterpiece on to one of the variously named four-colour plotters (MCP-40 etc), but regrettably there is no routine to dump the finished product onto a standard graphics printer. This appeared at first sight to be an interesting offering which allows you to explore shape

Supplier	Program	Age	Price
Dragon Data	Number Gulper	4-11	£10.95
Kenfig Industrial Estate	Words, Words, Words	5-8	£10.95
Margam	Hide and Seek	4-11	£10.95
Port Talbot	Number Puzzler	4-11	£10.95
West Glamorgan	Circus Adventure	4-8	£7.95
SA13 2PE	School Maze	4-8	£7.95
Ampsoft	Maths O' level		
P.O. Box 19	Revision Part One	16+	£14.95
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# The point of the plot

Mark Lawrence presents a machine code plotter program

This program is written in machine code and so has the advantage of being able to plot on the full 256 x 192 pixel screen as opposed to Basic where you can only plot on a 256 x 176 pixel screen. Likewise, all the commands available have this facility so it is, for example, possible to copy the whole screen to the ZX printer.

As well as commands for drawing and plotting, there are commands available for copying the ZX printer, filling in shapes, saving a screen to tape, loading a screen from tape, changing every occurrence of a specified ink or paper colour to another,

storing screens in memory, retrieving screens from memory, and swapping the screen with one stored in memory.

The plotting point is moved around the screen with the keys 5 to 8 and the above commands are activated using the keys listed in the menu incorporated within the program.

To enter the program first type in the short Basic program and Save "draw" Line 1, then verify it. Now type in the hex loader and run it. Enter 30000 as the start address as it is not possible to enter it to its correct address yet. The short Basic program will

handle this. Now enter the code and Save "draw code" Code 30000, 1760 then verify it. Clear the machine, by entering Randomize USR 0, and load the program from the start. If the code has been entered correctly a menu should be displayed. Should you not obtain this display type in the check program and load the code 30000 again. Now check the code against the listing and poke any incorrect entries.

When saving a screen to tape, start the tape and then press s. No message will be displayed as this would destroy the bottom line. To a shape, position the cursor within the shape and then press the f key. The routine will ask you for the colour.

The fill routine in this program is actually one previously published in *Popular Computing Weekly* but converted to work on the full 256 x 192 screen

```

Draw Basic
) 1ST
10 CLEAR 23999:LOAD ""CODE 24000
20 RANDOMIZE USP 24000
)

```

## DRAW CODE

```

5000 AF 67 0F 22 50 62 21 54
5008 82 27 28 3C 27 0D 88 0D
500D 0D 29 5E 0D 20 81 0D 00
500E 00 00 7A 0D 0D 02 60 0D
500F 81 00 0D 00 82 FE 10 0D
5010 20 61 FE 10 0D 05 60 FE
5011 00 20 04 0D 08 00 AF FE
5012 09 0C F3 5F FE 0F 0C 27
5013 5F FE 20 0C 1F 5F FE 1F
5014 0C FF 5E FE 1A 0C 05 5E
5015 FE 27 0C 0D 5E FE 01 0C
5016 9E 5E FE 10 0C 8E 5E FE
5017 11 0C 29 9E FE 20 20 AE
5018 09 3A 54 00 F9 0D 0D 5E
5019 0D 00 0D 21 2E 40 11 0F
5020 03 06 04 0D 2E 62 2E 00
5021 11 13 03 06 0D 2E 62
5022 21 00 48 11 AE 03 00 0A
5023 0D 2E 62 21 24 50 11 88
5024 04 06 18 0D 2E 62 AF 0D
5025 92 22 21 00 90 11 01 58
5026 01 60 00 38 17 0D 00 01
5027 00 38 30 0D 00 01 00 00
5028 76 02 0D 00 0D 00 02 F1
5029 32 54 02 03 83 5E 21 0D
5030 61 22 0D 5E 0D 5E 5E 21
5031 04 61 22 0D 5E 0D 0D 93
5032 81 21 0D 50 11 FA 02 00
5033 15 0D 2E 82 0D 03 61 FE
5034 05 30 F9 0D 01 5E 0B 05
5035 0D 0C 01 01 0D 04 61 AF
5036 09 07 5F 16 00 21 53 62
5037 19 5E 23 58 09 0D 70 60
5038 21 54 62 7E 5F 3C FE 05
5039 20 01 AF 77 7B 0D 01 5E
5040 0D 0F 81 AF 09 11 11 00
5041 05 0D 01 AF 37 0D 56 05
5042 0D 21 00 48 11 00 10 3E

```

```

5EF8 FF 37 0D 56 05 AF 09 0D
5F00 21 82 62 11 11 00 AF 37
5F08 0D 02 04 0D 21 00 40 11
5F10 00 10 3E FF 06 32 76 10
5F18 FD 37 0D 02 04 AF 09 F3
5F20 08 0D 0C AF 0E AF 09 0D
5F28 93 61 21 00 50 11 0B 62
5F30 08 0F 0D 2E 62 0D 03 01
5F38 0D 0C 01 0D 50 50 82 4F
5F40 3A 8D 0C 5E 5F 81 32 6F
5F48 5C 48 42 42 0D 95 5F 48
5F50 04 78 FE AE 02 6F 5F 05
5F58 03 0D 18 01 0D 01 22 01
5F60 01 05 05 0D 05 20 01 01
5F68 3C 3D FE 01 02 4C 5F 42
5F70 48 0D 96 5F 48 05 20 FE
5F78 01 0A 95 5F 05 0D 0D 10
5F80 01 0C 01 22 01 01 05 05
5F88 0D 05 20 01 01 3C 30 FE
5F90 01 02 70 5F AF 09 4B 05
5F98 05 0D 43 7D 3C 0D 10 61
5FA0 0D 0C 22 01 01 0C 79 FE
5FA8 FF 02 04 5F 05 0D 0C 10
5FB0 01 0D 01 22 01 01 05 05
5FB8 0D 05 20 01 01 3C 30 FE
5FC0 01 02 92 5F 48 05 0D 0D
5FC8 43 7D 3C 0D 10 61 0D 0C
5FD0 22 01 01 0D 20 FE 01 0A
5FD8 F2 5F 05 0D 0D 10 61 0D
5FE0 01 22 01 01 05 05 0D 05
5FE8 20 01 01 3C 30 FE 01 02
5FF0 05 5F 09 0D 93 81 21 00
5FF8 50 11 88 02 00 14 0D 2E
6000 62 0D 0D 62 FE 23 20 04
6008 FE 13 20 5D 0D 21 5F 02
6010 0D 77 00 11 0D 62 0D 2E
6018 02 06 14 0D 2E 62 0D 03
6020 01 0D 27 01 2E 07 00 07
6028 11 04 62 0D 2E 62 0D 03
6030 81 0D 77 02 0D 7E 00 FE
6038 20 17 0D 7E 01 17 17
6040 17 0D 77 01 0D 7E 02 17
6048 17 17 0D 77 02 38 32
6050 0D 61 0D 50 01 0D 5E 02
6058 0D 04 61 3E 07 32 0D 61
6060 0D 0C 61 AF 09 21 53 62
6068 7E 0E 01 77 0D 70 00 09

```





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## Negative thoughts

Jim Hind presents a simulation of the Geiger-Marsden experiment for the Spectrum

About the turn of the century, it was known that atoms contained electrons, but that was about all. No further details of the internal structure of an atom were yet understood.

Since an atom is electrically neutral, but an electron carries a negative charge, obviously an atom must contain a positive charge also. The favoured model was the "plum pudding", in which a uniform sphere of positive charge had tiny electrons dotted about within it. To examine the structure of the pudding in more detail, the atoms would be bombarded with either electrons, or alpha particles (helium nuclei) arising from the radioactive decay of heavy elements. The classic experiment was carried out in Manchester by Geiger and Marsden, and their results are simulated by this program.

At the bottom of the screen, a radioactive source fires alpha particles at a thin gold foil in the centre. Many pass straight through without hitting anything; the program ignores these. Occasionally an alpha particle will collide with an atom of gold in the foil and be scattered. A zinc sulphide screen

detects the scattered alpha particle. The program repeats until 1000 alpha particles have been scattered, displaying a count of those particles which hit the ZnS screen at the angle chosen. You are then given the option of placing the screen again and repeating the experiment.

The plum pudding model would suggest that the heavy alpha particles should be scattered by 10 or 20 degrees at most. Geiger and Marsden were baffled to find that an occasional particle would be deflected by anything up to a right angle. They reported this to Professor Ernest Rutherford, who promptly countered with a deliberately silly suggestion — why not see whether any particles were scattered by more than a right angle? Sure enough, alpha particles were bouncing back off the gold foil in all directions including almost directly backwards. Rutherford afterwards described this as being as incredible as firing the guns of a battleship at a piece of tissue paper, and having the shells come back and hit you.

After you've run the program a few times,

you may get rather frustrated waiting for a large-angle scatter; they don't happen very often. To speed things up a bit, amend line 1320 to:

```
1320 LET e(k)=e(k) + 1 PRINT AT k+1,27; e(k)
```

You can then increase the number of alpha particles by altering line 1205. Try 1205 FOR a = 1 TO 10000

Increasing the count past 65535 will not improve matters any further, though. After that you will be frustrated by the Spectrum's rather rudimentary *And* function.

These changes bypass the graphics routines and simply count up the total number of alpha particles scattered into each 10° sector. Remember, you're not expecting many large angle events: the surprise is that any are happening at all.

The explanation of the experiment is due to Rutherford; for scattering to happen like this, the electric fields inside the atom must be enormously greater than the plum pudding model would suggest. Geiger and Marsden have demonstrated the existence of the atomic nucleus. The "solar system" model of the atom, with a heavy (and extremely tiny) nucleus at the centre, with electrons orbiting round it, has been with us ever since.

### Notes

The gold foil is printed with a Graphic G at line 1030. The various alpha's are Graphic A's.

```

1000 LET x(1)=80+80+SIN (phi+0.0
11) LET y(1)=80+80+COS (phi+0.00
12)
1200 LET x(1)=80+80+SIN (phi+0.0
13) LET y(1)=80+80+COS (phi+0.00
14)
1300 LET x(1)=80+80+SIN (phi+0.0
15) LET y(1)=80+80+COS (phi+0.00
16)
1400 LET x(1)=80+80+SIN (phi+0.0
15) LET y(1)=80+80+COS (phi+0.00
16)
1500 GO TO 1200
1600 REM *****
1610 DRAW 0 INK 4
1620 PLOT 0,0,0,0
1630 FOR n=0 TO 4
1640 DRAW BRIGHT 1,(n)-(n-1),y
1650 y=y-1
1660 NEXT n
1670 DRAW 0 INK 4
1680 PLOT 0,0,0,0
1690 REM *****
1700 GO SUB 1000 GO SUB 1000
1710 FOR a=1 TO 1000
1720 LET phi=RND
1730 FOR i=1 TO 17
1740 IF phi<0.11 THEN LET e=i
1750 GO TO 1300
1760 NEXT i
1770 DRAW 0 INK 4
1780 PLOT 0,0,0,0
1790 DRAW BRIGHT 1,OVER 1,INK
1800 J=0
1810 PLOT OVER 1,INK 2,0.0,0
1820 DRAW OVER 1,INK 2,0.0,0
1830 INK 1,0.0,0,0,0,0
1840 DRAW 2
1850 NEXT a
1860 PRINT AT 10,10: PAPER 0, IN
1870 K
1880 GO SUB 1000 LET e(i)=e(i)+1
1890 PRINT AT k+1,27; e(i)
1900 NEXT
1910 RETURN
1920 INPUT "Repeat 1 to a different
1930 position? (Y/N)";a
1940 IF a="Y" OR a="N" THEN GO
1950 TO 1000
1960 IF a="Y" OR a="N" THEN CL
1970 S GO TO 1000
1980 GO TO 1000

```



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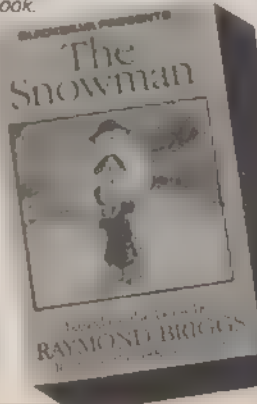
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## Handle with care

Jason Orbaum and Geoffrey Campbell continue their series on Assembly language with a discussion of data handling commands

We have already discussed a few of the assembler commands in previous parts, but there are a lot more where they came from. The commands can be split into two, admittedly very broad, groups. First there are those which perform arithmetic and logic functions, and secondly there are those that perform data handling tasks. Before we deal with these, it is necessary to have very clear visualisation of how the processor stores and handles numbers.

As has been mentioned before, numbers are stored in binary form. There are two ways of storing numbers — unsigned or signed. If a number is unsigned, it can be between 0 and 255. If, on the other hand, it is signed, it can be between -128 and 127. The signed numbers are stored in two's complement form, which means that the left-most bit is treated as -128 instead of 128, as in an unsigned number. Thus:

```
01100010 = 98 (but
11100010 = -30 (work it out!))
```

All the data handling commands can work on either memory or register numbers. The *LSL* and *LSR* command will shift the bit-pattern of a byte along by one, bringing a zero in on the end. The mnemonics stand for logical shift left and logical shift right. The effect of this is respectively to multiply and divide the number by two, but it will obviously give an integer answer.

If we carry this operation out on the two example numbers above, we get:

```
LSL 01100010 = 11000100
LSR 01100010 = 00110001
LSL 11100010 = 11000100
LSR 11100010 = 01110001
```

The *ASL* and *ASR* command will shift all the bits of the number along by one, in a similar way to *ASR* and *ASL*, but it leaves the sign bit (the left-most one) alone. The

mnemonics stand for Arithmetic Shift Left and Arithmetic Shift Right. If, these commands are carried out on the two example numbers above, we get:

```
ASL 01100010 = 01000100
ASR 01100010 = 00110001
ASL 11100010 = 11000100
ASR 11100010 = 11110001
```

With all four of these commands, the state of any bit that is shifted out of the bit-pattern is preserved in the C-bit of the Condition Code.

### ROL and ROR

This operation is similar to the logical shifts, but the bit which comes on at the end is not a zero, but the contents of the C-bit. The state of the bit that is shifted out of the bit-pattern is preserved in the C-bit. If we assume that the C-bit contains one initially for all of these operations, we now get these results:

```
RCL 01100010 = 11000101 - C-bit contains zero.
RCL 01100010 = 10110001 - C-bit contains zero
RCL 11100010 = 11000101 - C-bit contains one
RCL 11100010 = 11110001 - C-bit contains zero
```

The format for these commands is:

*RORA*

*RORL*

*ROL* memory address

or any combination of register or memory and command.

The *EXG* and *TFR* commands are used to EXchange or TransFER the contents of any pair of registers (as long as they are the same size — it is impossible to exchange the contents of A with those of X).

The only difference between the two is that *EXG* preserves the contents of both registers, whilst *TFR* duplicates the contents of the first specified register.

### PSH and PUL

The workings of a stack were discussed



Geoffrey Campbell (left) and Jason Orbaum

in parts two and four, and these are the commands to use when accessing them. *PSHS* will put the contents of the specified registers on to the stack.

If a program contains the commands:

```
PSHS A,X,Y
PULS A,X,Y
```

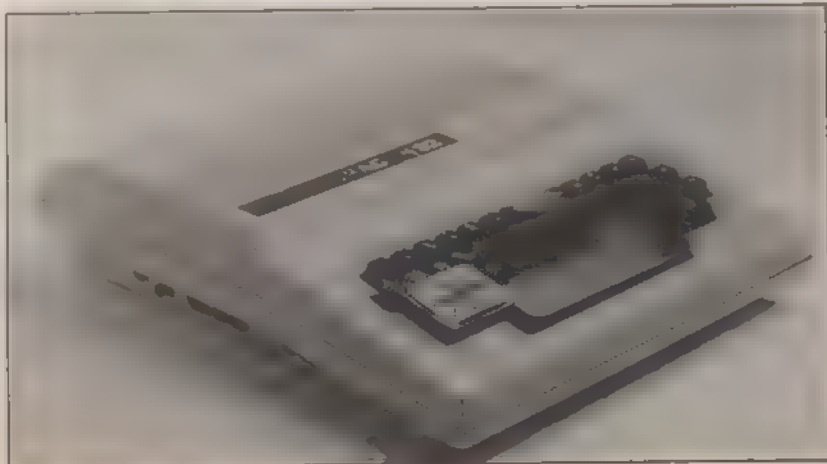
then the processor will put the contents of the A, X and Y registers on the system stack, carry on with the program, and then pull A, X, and Y, in the opposite order to the order that they were pushed, to avoid getting them swapped round. The order that the registers are pushed onto the system stack is as follows:

PC U Y X DP B A CC

from left to right. The order for the user stack is the same, but, as it would be unwise to push the pointer for the stack in use, the S register is pushed instead of the U register.

As has already been mentioned, the system stores the return addresses for subroutines on the stack, so if a program fails to work, check the positioning of all *PSH* and *PUL* commands.

Next week we will finish off describing the instruction set with the arithmetic instructions.





## Colour blind

Jeff Tullin presents a program that tests for colour blindness

The program was written for the BBC computer and is primarily intended as a simple means for testing for colour blindness in a local infirmary. The idea was that it should be operable by "one finger" typists, or mentally retarded people.

The program draws seven coloured blocks on the screen and plays a short piece of music. Following this, a randomly coloured block appears underneath, and

moves in stages left to right. When the moving block is underneath the matching colour, the examinee is required to press the spacebar, which will elicit a musical response depending upon whether they are correct.

At the end of the round the score is displayed and pressing any key will re-run the program. As the volume, speed, and length of the test are very much a matter of

individual preference, the escape key can be used to select a menu for altering these parameters (Procaller).

The structure of the program lies between lines 70-560 and, I hope, is fairly clear. Lines 379-410 ensure that the spacebar is no longer depressed before moving on.

On a final note, the program can be used to test reaction time by selecting a short "speed of reaction" time. Due to the use of mode 7 graphics, the program will not run on the Electron as it stands, but the structure of the program would allow a fairly easy translation to another mode, by changing the print statements.

"COLOUR MATCH" by J. TULLIN  
1984

```
1 *KEY100LD:MRUN:M
10 DATA2,7,12,17,22,27,32
15 DATA32,129,157,32,32,32,130,157,
32,32,32,131,157,32,32,32,132,157,32,3
2,32,133,157,32,32,32,134,157,32,32,32
,135,157,32,32,32,157,158
20 DATAA,3,F,3,M,3,D,3,M,3,F,3,C,3,
F,3,M,3,B,3,K,1,5,J,1,5,F,4
30 DIMPOSITION(9)
50 VOLUME=-12:IN1=12:SPEED=70
60 ONERRORIFERR=12PROCALTERELSEREPO
RT:END
70 MODE2
90 VDU23:10,32;0;0;0;
110 PROCVARIABLES
130 PROCINTRO
150 PROCTUNE
170 PROCKEYPRESSED(100)
190 REPEAT
210 PROCDRAWBLOCKS
230 PROCCHOOSECOLOUR
250 REPEAT
270 PROCTESTBLOCK(COLOR)
290 NO=VALUE:VALUE=(VALUE+1)MOD8
IFVALUE=0VALUE=1
310 UNTILKEYPRESSED
330 PROCHECK
350 IFRIGHTTHENPROCHAPPYELSEPROCOOPS
370 FORLOOP=1TO10
390 IFINKEYS(20)<>"GOTO390
410 NEXT
430 IFRIGHTTHENSORE=SCORE+1
450 TRIES=TRIES+1
470 UNTILTRIES=LIMIT
490 PROCTUNE
510 PROCSCORE
530 PRINTTAB(4,18)CHR$(141)CHR$(134
3"ANY KEY FOR ANOTHER ROUND"
540 PRINTTAB(4,19)CHR$(141)CHR$(130
3"ANY KEY FOR ANOTHER ROUND"
550 DUMMY=GET
560 GOTO70
570 CLS
590 DEFPROCINTRO
610 PRINTTAB(10,1)CHR$(141)CHR$(129)
"COLOUR MATCH"
```

```
630 PRINTTAB(10,2)CHR$(141)CHR$(129)
"COLOUR MATCH"
650 PROCKEYPRESSED(50)
670 PRINTTAB(4,5)CHR$(141)CHR$(131)"
PLEASE MATCH THE COLOURS"
690 PRINTTAB(4,6)CHR$(141)CHR$(131)"
PLEASE MATCH THE COLOURS"
710 PRINTTAB(4,8)CHR$(141)CHR$(131)"
BY PRESSING THE";CHR$(133);"SPACEBAR"
730 PRINTTAB(4,3)CHR$(141)CHR$(131)"
BY PRESSING THE";CHR$(134);"SPACEBAR"
750 ENDPROC
770 DEFPROCKEYPRESSED(DURATION)
790 KEYPRESSED=INKEY(DURATION)+1
810 ENDPROC
830 DEFPROCTUNE
840 RESTORE20
850 FORTUNE=1TO13
860 READnote$,len:note=(ASC(note$)
-43)*4:len=len*4
870 SOUND1,VOLUME,note,len:SOUND2,
VOLUME,note,len:NEXT
880 FORTUNE=1TO6000:NEXT
890 ENDPROC
910 DEFPROCURAWBLOCKS
930 PRINTTAB(0,12);FARROW=1TO5:PRIN
TBLOCK$:NEXT
1010 ENDPROC
1030 DEFPROCCHOOSECOLOUR
1050 COLOR=RND(2)
1070 ENDPROC
1090 DEFPROCTESTBLOCK(COLOR)
1110 PRINTTAB(POSITION(VALUE),18)CHR$
(144+COLOR)"nB="
1130 PROCKEYPRESSED(SPEED)
1150 PRINTTAB(POSITION(VALUE),18)"
1170 ENDPROC
1190 DEFPROCHECK
1210 IFNO=COLORRIGHT=TRUEELSERIGHT=FALSE
1230 ENDPROC
1250 DEFPROCHAPPY
1270 SOUND1,VOLUME,148,2:SOUND1,VOLUM
E,152,2:SOUND1,VOLUME,180,3
1290 ENDPROC
1310 DEFPROCOOPS
1330 SOUND1,VOLUME,15,5:SOUND1,VOLUME
,4,8
```

```

1350 ENDPROC
1370 DEFPROCSCORE
1390 CLS
1410 PRINTTAB(11,8)CHR$(141)CHR$(134)
"YOU SCORED "
1430 PRINTTAB(11,9)CHR$(141)CHR$(134)
"YOU SCORED "
1440 SPACE=11:IFLIMIT>9SPACE=10
1450 PRINTTAB(SPACE,12)CHR$(141)CHR$(
133);SCORE;" OUT OF ";LIMIT
1470 PRINTTAB(SPACE,13)CHR$(141)CHR$(
133);SCORE;" OUT OF ";LIMIT
1490 ENDPROC
1510 DEFPROCVARIBLES
1530 RIGHT=0:TRIES=0
1550 value=1
1580 SCORE=0
1610 KEYPRESSED=FALSE
1630 RESTORE
1640 FORZ=1TO7:READPOSITION(Z):NEXT
1645 BLOCK$=""
1650 REPEAT:READCELL:BLOCK$=BLOCK$+CH
R$(CELL):UNTILCELL=156
1660 NO=1
1680 ENDPROC
1700 DEFPROCALTER
1710 CLS
1720 PRINTTAB(3,3)CHR$(129)"TIME ALLO
WED FOR KEYPRESS=";CHR$(130)SPEED

```

```

1730 PRINTTAB(3,5)CHR$(129)"VOLUME OF
MUSICAL PIECES =" ;CHR$(130);ABS(VOLUME)
1740 PRINTTAB(3,7)CHR$(129)"NUMBER OF
GOES PER ROUND =" ;CHR$(130);LIMIT
1750 PRINTTAB(3,10)CHR$(134)"WHAT WOU
LD YOU LIKE TO ALTER?"
1760 PRINTTAB(7,14)CHR$(130)"1";CHR$
(133);"TIME ( 10-200 )"
1770 PRINTTAB(7,15)CHR$(130)"2";CHR$
(133);"VOLUME ( 0-15 )"
1780 PRINTTAB(7,16)CHR$(130)"3";CHR$
(133);"GOES ( 1-255 )"
1790 PRINTTAB(7,17)CHR$(130)"4";CHR$
(133);"NOTHING"
1800 A=GET
1810 A=A-48:IFA<10RA>4THENGOTO1800
1820 GOTO(1820+A*10)
1830 INPUTTAB(9,21)"TIME ",SPEED:PRIN
TTAB(9,21)" " ;IFSPEED
<10SPEED=10:GOTO1710
1840 INPUTTAB(9,21)"VOLUME ",VOLUME:1
FVOLUME>15UOLUME=15:VOLUME=VOLUME*TRUE
:GOTO1710:ELSEIFUOLUME<0VOLUME=0:GOTO
710:ELSEVOLUME=UOLUME*TRUE:GOTO1710
1850 INPUTTAB(9,21)"GOES ",LIMIT:PRIN
TTAB(9,21)" " ;LIMIT
<LIMIT=1:GOTO1710
1860 ENDPROC
>

```

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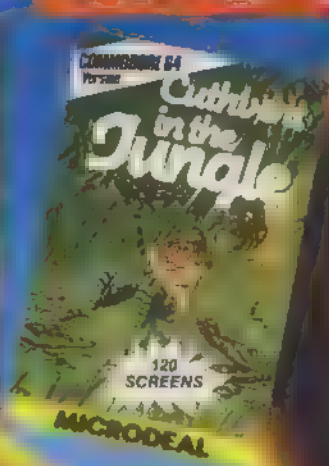
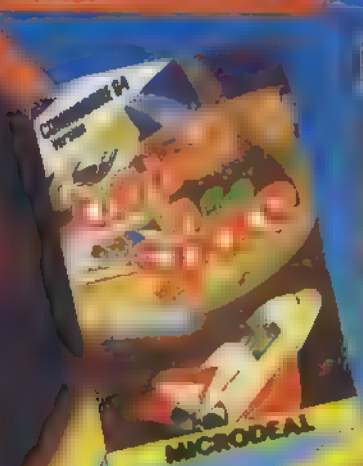


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


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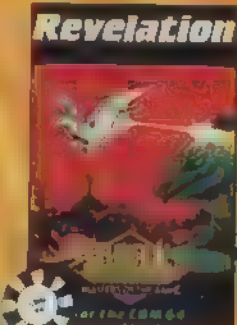
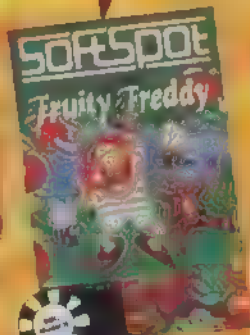
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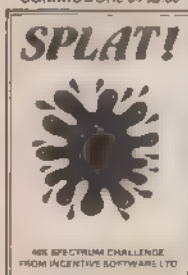


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## In the moog for music

**Paul Irvin** presents a program to simulate a musical synthesizer

**T**his program allows your computer to simulate a musical synthesizer. Up to 10 different sounds may be defined and used to play on any or all three of the 64's voices. Each voice has a range of eight octaves and each can be turned on or off.

The main menu of the program prompts you to define a sound, save it to memory, and then play any combination of the defined sounds on the keyboard.

### Program Notes

lines	
30-50	set up variables, arrays & memory locations
60-110	print main menu
120	wait for a key to be pressed
130	GOSUB to a routine depending on the key pressed
1000-1999	subroutines for defining a sound
3000-3999	reset a voice subroutine
4000-4999	save a sound subroutine
5000-5110	musical keyboard subroutine

10000-10070	menu for defining a sound
20000-20020	program title subroutine
30000-30020	binary - decimal conversion
40000-40040	decimal - binary conversion
50000-50090	input number in binary routine
60000-60190	data for machine code
80020-80400	place data into memory

Basically the machine code routine is used to convert keyboard entries into frequency values needed to produce a sound. The frequencies for the base octave, octave 0, can be found in lines 60195-60196, as they appear in the *Programmers Reference Guide*. These values are different to the ones in the *Users Guide*, and may be used instead.

## SUPER 910

```

15 REM "SUPER 310 FOR
16 REM "BY PAUL
17 REM "CMT / 1
18 REM "
19 REM "
20 POKES3280,14:POKE53281,6:POKE646,14
21 IFPEEK(50176)=128THEND30
22 PRINT:"MUSIC PLEASE WAIT - LOADING DATA" GOSUB60200
30 SIO=54272:REN=49152:SO=0
40 DIMA(16):N$=""
42 FOR=0T05 NEXT
45 FOR=0T02:POKE168+T,0:POKE171+T,NEXT
47 POKE165,5:POKE166,5:POKE167,5
49 POKE175,0:POKE178,0
50 FOR=1T015 A(1)=0:NEXT
60 GOSUB20000
80 PRINTA$(15):NEXTA$
90 PRINT:"-----" EPIFNE SOUND:PRINT:"-----" ESET 0
100 PRINT:"-----" WAVE SOUND:PRINT:"-----" JUDICIAL KEYBOARD:PRINT:"-----" QUIT
PROGRAM
110 PRINT:"-----" SELECT 0 TO "
120 GETI$A:IFI$A(1)ORI$A(2)THEND30
130 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
140 IFROUTE=5THENDCLR:PRINT:"LIST-15"
150 FORT060
1600 GOSUB20000:GOSUB10000:PRINT:"-----" FOR=1T016 PRINT:,,A(1) NEXT
1604 GETI$A:IFI$A(1)ORI$A(2)THEND30
1608 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1609 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1610 FORT060
1612 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1613 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1614 FORT060
1616 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1617 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1618 FORT060
1620 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1621 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1622 FORT060
1624 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1625 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1626 FORT060
1628 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1629 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1630 FORT060
1632 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1633 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1634 FORT060
1636 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1637 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1638 FORT060
1640 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1641 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1642 FORT060
1644 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1645 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1646 FORT060
1648 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1649 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1650 FORT060
1652 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1653 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1654 FORT060
1656 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1657 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1658 FORT060
1660 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1661 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1662 FORT060
1664 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1665 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1666 FORT060
1668 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1669 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1670 FORT060
1672 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1673 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1674 FORT060
1676 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1677 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1678 FORT060
1680 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1681 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1682 FORT060
1684 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1685 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1686 FORT060
1688 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1689 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1690 FORT060
1692 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1693 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1697 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1700 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1701 FORT060
1702 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1703 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1704 FORT060
1706 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1707 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1708 FORT060
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1711 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1715 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1716 FORT060
1718 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1719 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1720 FORT060
1722 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1723 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1724 FORT060
1726 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1727 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1728 FORT060
1730 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1731 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1732 FORT060
1734 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1735 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1736 FORT060
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1739 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1740 FORT060
1742 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1743 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1744 FORT060
1746 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1747 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1748 FORT060
1750 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1751 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1752 FORT060
1754 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1755 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1759 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1763 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1764 FORT060
1766 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1767 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1770 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1771 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1791 IFROUTE=5THENDCLR:PRINT:"LIST-15"
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1794 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1795 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1796 FORT060
1798 ROUTE=ASC(I$A(1))-64:ORROUTE=GOSUB10000,3000,4000,5000
1799 IFROUTE=5THENDCLR:PRINT:"LIST-15"
1800 FORT060
1802 ROUTE=ASC(I$A(1))-
```

# Commodore 64

```

0004 PRINT "TIT" C=C+1 IF C=10 THEN C=B
0040 GOTO 4010
0050 POKE 650,0 V=50:11
0055 INPUT "NAME OF SOUND";N$(50) N$(50)=LEFT$(N$(50),9)
0060 IF LEN(N$(50)) < 9 THEN N$(50)=N$(50)+ " " GOTO 4057
0060 POKE N+V,A(1):POKE N+V+1,A(2):POKE N+V+2,A(3):POKE N+V+3,A(4)
0065 POKE N+V+4,A(5):REM WAVEFORM
0070 POKE N+V+5,A(6)+A(7):REM R/D
0080 POKE N+V+6,A(8)+A(9):REM S/R
0090 POKE N+V+7,A(10):POKE N+V+8,A(11):REM CUT OFF
0100 POKE N+V+9,A(12)+A(13):REM FILT
0110 POKE N+V+10,A(14)+A(15):REM VOL
0120 RETURN
5000 OSUB 20000:PRINTAB(12):GOTO 5010
5010 PRINTAB(11)
5020 PRINTAB(11)
5030 PRINTAB(11)
5040 PRINTAB(11)
5050 PRINTAB(11)
5060 PRINTAB(11)
5070 PRINTAB(10)
5080 PRINTAB(5)
5090 PRINT "NOCTAVE","SOUND","VOICE 0=OFF 1=ON"
5095 PRINT "MID"
5096 POKE 255,192:POKE 253,212:POKE 251,64:POKE 252,0:POKE 254,0
5099 SVS50176 REM ENTER MACHINE CODE
5100 FOR I=0 TO 2
5105 PRINT "PEEK(165+I)";PEEK(165+I)
5110 PRINT "PEEK(168+I)";PEEK(168+I)
5115 IF PEEK(165+I) < 64 THEN PRINT "PEEK(168+I)";PEEK(168+I)
5120 PRINT "TIT" GOTO 5010
10000 PRINT "TIT"
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13100 PRINT "TIT"
13110 PRINT "T
```



## BBC and Electron

Exercise your Brain instead of your Fingers  
An addictive game of skill and strategy



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## Currency Converter

on Spectrum

This program was written to produce a conversion table to enable the holidaymaker to find out the value of the pound, but with a few simple alterations it could convert inches to centimetres; ounces to grams; miles to kilometres and in each case, vice versa.

The program allows you to make a copy of the table on the ZX Printer.

If you have never encountered a table of this type before, here is a brief explanation. Take for example the following line:

0.76                      9                      107.01

Assuming the first column is francs and the right-hand column is pounds, we can see: 9 pounds are worth 107.01 francs, and 9 francs are worth 0.76 pounds (ie, 76p).

Please note that £1.5 on the table would mean £1.50 not £1.05. The figures calculated are to the nearest hundredth of the currencies used.

### Variables

n\$	Name of foreign currency
r	Exchange rate
L	Length of n\$
A	Control variable
P	Central column figure on table
g	Line number to GO TO after menu selection

### Program notes

- 10 Set-up screen. Poke 23693,58 = Ink 0; Paper 7; Flash 0; Bright 0
- 30 At 0.0 is added to the input to prevent the screen from scrolling up
- 50 At 2.0, At 2.0 is not a mistake — the first At 2.0 clears line 2 of the screen
- 90 and 110 n\$( To (8 And L:8)+(L And L:8)) prevents the name of the foreign currency from spilling over onto the next line.
- 130 Calculate and print values.
- 140 Menu. Print#0; At 0.0 prints the menu on the first of the bottom two lines.
- 170-180 Goto section corresponding to user's selection from menu.
- 190 Copy table.
- End program
- The Data corresponds with the central numbers on the table. The numbers can be changed to suit individual needs.

```

1 REM
2 REM
3 REM
4 REM
5 REM
6 REM
7 REM
8 REM
9 REM
10 POKE 23658,8: POKE 23693,58
11 BORDER 0
12 CLS
13 PRINT INVERSE 1: "
14 Currency Conversion Table
15 "
16 INPUT AT 0,0, "Enter the name of the currency": LINE n$: LE
17 T L=LEN n$
18 INPUT AT 0,0, "Enter the exchange rate": r: IF r
19 <=0 THEN GO TO 40
20 PRINT AT 2,0, AT 2,0, INK 2
21 ; "POUNDS", TAB 23; n$( TO (8 AND
22 L:8)+(L AND L:8))
23 RESTORE
24 FOR a=1 TO 16
25 READ P
26 PRINT AT a+2,0, AT a+2,3, (
27 INT ((1/r*p)*100+.5)/100, TAB 14
28 ;
29 PRINT INK 1,P; TAB 24;
30 PRINT (INT ((r*p)*100+.5))
31 /100
32 NEXT a
33 PRINT AT 0,0, "Press 'R'
34 TO RE-RUN, 'E' TO END, or 'C'
35 FOR A COPY."
36 POKE 23658,8
37 PAUSE 0
38 LET i$=INKEY$
39 LET g=(30 AND i$="R")+(190
40 AND i$="C")+(210 AND i$="E")
41 GO TO (g AND g<10)+(150 AND
42 g=0)
43 INPUT INKEY$: COPY
44 GO TO 130
45 STOP
46 DATA 1,2,3,4,5,6,7,8,9,10,1
47 5,20,25,30,40,50,75,100
  
```

Currency Converter  
by Andrew Wiseman

## Alphasort

on Vic20

This program sorts into alphabetical order a number of words that are entered by the user.

Firstly type in the program and Run it.

Then enter the number of words you wish to enter and sort. Next, enter the words one at a time. The correct alphabetical order will be displayed on the screen.

### Program Notes

10-150 Instructions  
160-230 Input words into array

240-310 Print sorted words  
400-490 Subroutine to sort words

### Variables

A Number of words  
A(A) Size of array  
C 3rd string variable used to swap two words in the array  
B Current inputted word

```

10 REM *** ALPHA-SORT ***
20 CLR
30 PRINT "0";TAB(12);"ALPHA-SORT"
40 PRINT TAB(12);"-----"
50 PRINT:PRINT:PRINT
60 PRINT TAB(7);"THIS PROGRAM PRINTS"
70 PRINT
80 PRINT TAB(7);"OUT IN ALPHABETICAL"
90 PRINT
100 PRINT TAB(7);"ORDER THE WORDS (OR)"
110 PRINT
120 PRINT TAB(7);"NAMES) YOU TYPE IN."
130 PRINT:PRINT:PRINT:PRINT:PRINT
140 PRINT "  PRESS THE SPACE BAR TO BEGIN"
150 GET A$:IF A$(">") THEN 150
160 INPUT "0HOW MANY NAMES PLEASE ";A
170 IF A<1 THEN 160
180 DIM A$(A)
190 FOR C=1 TO A
200 PRINT "0NAME";C;"IS ";:INPUT B$
210 A$(C)=B$
220 PRINT "0"
230 NEXT C
240 PRINT "0ALPHABETICAL ORDER IS..."
250 PRINT
260 FOR D=1 TO A
270 GOSUB 400
280 NEXT D
290 FOR E=1 TO A
300 PRINT A$(E)
310 NEXT E
320 PRINT:PRINT:PRINT:PRINT:PRINT
330 PRINT TAB(8);"ANOTHER GO ? (Y/N)"
340 GET B$:IF B$="Y" THEN 10
350 IF B$(">N") THEN 340
360 PRINT "0BYE!!!"
370 END
400 REM
410 REM SUBROUTINE TO SORT WORDS
420 REM
430 FOR B=1 TO (A-1)
440 IF A$(B)>A$(B+1) THEN 460
450 C$=A$(B)
460 A$(B)=A$(B+1)
470 A$(B+1)=C$
480 NEXT B
490 RETURN

```

**Alphasort**

by Gavin Aitken



## Russian Roulette

on ZX81

In this short 1K program, you have to pick 3 of the 6 chambers in the gun. If you pick the full chamber, you will see the gun fire.

### Program notes

10 Variables  
30-130 Main part  
140-200 Full or empty chamber?  
201-205 Gun fire

```

1 REM RUSSIAN ROULETTE 1K ZX
81
10 LET N=INT (RND*6)+1
20 CLS
30 PRINT "RUSSIAN ROULETTE"
40 PRINT AT 3,0;"IN THE GUN, THERE ARE 6 CHAMBERS."
50 PRINT "1 IS FULL, PICK ONE 1-6)"
60 FOR K=1 TO 3
70 IF K=1 THEN PRINT "1ST"
80 IF K=2 THEN PRINT "2ND"
90 IF K=3 THEN PRINT "3RD"
100 PRINT "GUESS PLEASE?"
110 PRINT AT 15,10;" " AT 16,10;" " AT 17,10;" "
120 INPUT I
130 PRINT I;" IS"
140 IF I=N THEN GO TO 200
150 PRINT "EMPTY."
151 PAUSE 30
160 CLS
170 NEXT K
180 PRINT "VERY WELL DONE, YOU SURVIVED"
190 STOP
200 PRINT "FULL, YOU DIE"
201 FOR A=8 TO 0 STEP -1
202 PRINT AT 15,A;" "
203 PAUSE 5
204 NEXT A
205 PRINT AT 15,0;"X"
    
```

Russian Roulette

## Microradio

GW6JJN



### Dragon interpreter

Many of you will remember that *Microradio* recently covered the subject of NOS Basiccode 2 which, if implemented on your computer in the form of an interpreter program, would make your computer compatible with a host of other makes of machine. This is, of course, ideal for radio-computing enthusiasts since it means that they can send and receive data and programs over air almost irrespective of the computer at each end.

The good news this week is for Dragon Users. The prolific

Grosvenor Software, who produced the excellent G4BMK RTTY program, has now produced a Basiccode interpreter for the Dragon. This means that the Dragon will join the Commodore and BBC users who can enjoy not only Basiccode communications, but the benefit of free software transmitted by the BBC Radio program *Chip Shop* among other stations around the country. If you can receive Dutch radio, free programs are also transmitted by the *Hobbyscoop* programme on NOS Radio Netherlands.

On the subject of Grosvenor Software, they have sent me a Morse Code Transceiver program for the Dragon which I will review when I receive the necessary interface. If this program measures up to the RTTY program they produced, then a new world will be opened up to Dragon users. Don't forget that you don't need an amateur radio licence, or any licence for that matter,

to receive radio signals. Any Dragon owner who has or can borrow a short wave radio receiver can receive RTTY as well as morse.

If you do not have a Dragon, don't worry since there are programs available for most micros. Those of you who are a little tired by games might like to try decoding some of these signals. There is everything from weather ships and oil tankers to the big news agencies and satellites that you can decode on the micro in your own home. This was never so easy before the advent of home computers and plugging in a radio receiver will connect your computer to the real world outside at very little cost. It will also lead to the exciting hobby of amateur radio if you're not too careful.

Grosvenor Software can be reached at 22 Grosvenor Road, Seaford, E Sussex. Staying on the subject of Dragons, those of you who read our sister magazine, *Dragon User*, will

have heard of Dragnet. It is a group of amateurs with Dragon Computers who meet each Sunday Morning at 11.00am on 144.525Mhz to discuss things like the possibilities of using their micros within the radio hobby. It can be heard over a wide area of the East Midlands so, if you are of a like mind, then I'm sure you will be welcome either to listen or to join in.

I am constantly surprised by the number of people who use Dragon micros as RTTY terminals or simply as radio helpers for tracking satellites or learning morse. If you have any programs in this line, *Microradio* will be pleased to hear from you.

Ray Berry GW6 JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, tips and tips to share, or topics that you would like to see covered, write to: Ray Berry, *Microradio*, Popular Computing Weekly, 10-13 Little Newport Street, London WC2R 3LD.

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## Arcade Avenue

## Jetset Willy

**T**he most exciting news of the last couple of weeks must be the release of *Jetset Willy* — the follow up to Software Projects' excellent *Manic Miner*. It's almost not worth while reviewing *Jetset Willy* since the program is inevitably going to reach number one in the charts. For what it's worth Matthew Smith has produced a sixty screen marvel that dwarfs most other arcade games produced for the Spectrum, and

retains all the sense of fun and originality of *Manic Miner*. In the next few weeks I plan to take a look at some of the other games produced by Software Projects to see how they rate. I am sure it's a company we will hear more of in the future.

Whilst on the subject of M.M. here is a neat program from John Dutchman-Smith of Wigan that brings together a couple of the 'cheat' routines for *Manic Miner* that some of you may have missed. As a bonus the listing allows you to modify and alter the screen

titles to read anything you would like (within a 32 character size maximum). So if you know someone who looks uncannily like Eugene Evans, or even a Kong beast, you can give them a special treat (?) the next time they visit.

The published listing allows you to select screens on the old Bug-Byte versions but the word from the horse's mouth is that to produce the same effect on the Software Projects' edition you must type the word *TYPEWRITER*, holding the 9 key down, before you can enter

the short numeric codes for each different screen. That's it for this week — write in and tell me what the best arcade games are for your machine, tell me about the rubbish too!

### Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing ups on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

[illegible]

```

CHARACTERS=AS
370 IF AS="F" THEN DIM HS(95)
OR A=1 TO 92 LET HS(A)=CHR$(22
40191+A) NEXT A GO TO 410
380 LET BS= LET CS=BS+BS+BS
TO 281
390 LET MS= . . . +AS+CS( TO 92-
LEN AS)
400 FOR A=1 TO 95 POKE 40191+A
CODE HS(A) NEXT A
410 PRINT AT 14,0 FOR F=1 TO
LET OS=HS(11-F)*221+1 TO F*3
GO SUB 1000 PRINT NEXT F
420 PAUSE 50
430 GO TO 70
440 STOP
500 PRINT AT 6,0 LET OS=
SELECT OPTION GO SUB 1000
PRINT
610 LET OS= 1 LIFE PROTECTI
ON ON GO SUB 1000 PRINT
720 LET OS= LIFE PROTECTI
ON ON GO SUB 1000 PRINT
830 IF OS=1 THEN POKE 351
940 IF OS=2 THEN POKE 351
1050 GO TO 430
1160 PRINT LET OS=" HOW TO O
BTAIN PRACTICE SCREENS" GO SUB
1000 PRINT
1270 LET OS="YOU CAN OBTAIN WHIC
HEVER SCREEN" GO SUB 1000
1380 LET OS="YOU WISH IN THE FOL
LOWING WAY" GO SUB 1000 PRINT
1490 LET OS="START THE GAME AND
PRESS ENTER" GO SUB 1000
1600 LET OS="NEXT KEY IN THIS NU
MBER" GO SUB 1000
1710 IF OS=1 THEN POKE 351
1820 LET OS="IF CORRECTLY KEIED
IN BOOT GO SUB 1000
1930 LET OS="WILL APPEAR TO SEL
ECT A SCREEN" GO SUB 1000
2040 LET OS="PRESS TOGETHER THE5
" GO SUB 1000 PRINT
2150 PAUSE 700
2260 LET N=1 TO 20
2370 LET NSTARS=N IF N/10 THEN
PRINT " "
2480 LET OS="SCREEN "+NS+" "+DS
GO SUB 1000
2590 GO SUB 1000 POKE 23692,255
NEXT OS
2700 INPUT COPY " (Y/N) "
2810 IF COPY="Y" THEN COPY
2920 GO TO 70
3030
3140
3250
3360
3470
3580
3690
3800
3910
4020
4130
4240
4350
4460
4570
4680
4790
4900
4010 TO MEN OS=1 PRINT
4110 TO MEN OS=2 PRINT
4210 TO MEN OS=3 PRINT
4310 TO MEN OS=4 PRINT
4410 TO MEN OS=5 PRINT
4510 TO MEN OS=6 PRINT
4610 TO MEN OS=7 PRINT
4710 TO MEN OS=8 PRINT
4810 TO MEN OS=9 PRINT
4910 TO MEN OS=10 PRINT

```



# Walters

## LOOK

### GAMES PROGRAMMERS

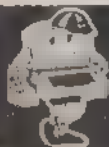
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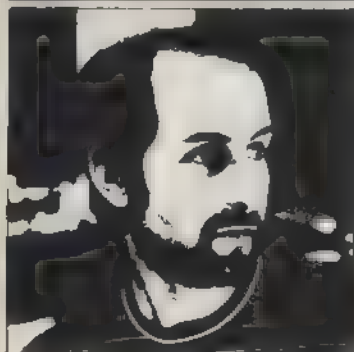
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# Tony Bridge's Adventure Corner



## The Quill

To start this week, some more *Knight's Quest* problems. Mike Young and his daughter Sarah are currently stuck in the stone chamber. You're right, Mike, in getting your squire to pull the lever.

"First, how do I get him to let go of the lever? I would hate to think of him stuck there for the rest of the adventure! Second, how do you get down the sheer drop without killing yourself — there doesn't seem to be anywhere to tie the rope. Third, having got to the lake, how do you release the boat to get out onto the lake itself? Do we need the dwarf to help here?"

Using the Corner Code, try these two clues for your first two questions:  
RCRA / OLPI / ETAN / NEDD / CWLA / IRMF / B+DL /  
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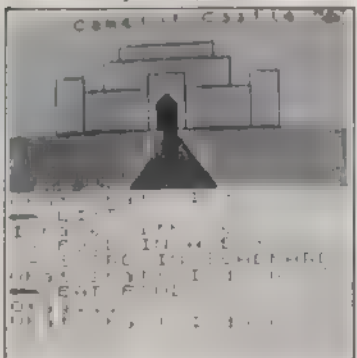
As for the boat — well, you could try a bit of knitting (you know, knit one, pearl one)! It's nice to know that you have such regard for the dwarf, that's why I like this particular adventure; it has such a good feeling of atmosphere. But you will certainly need the good dwarf at a later stage (at this point you have got about a quarter of the way through the adventure). Mike continues:

"Let me thank you for your recent clue for Artie's *Ship of Doom*. This was just what we needed and have since managed to complete the whole adventure. Personally, I feel the Artie's Adventures are not as difficult as they are sometimes made out to be (this one seemed easy compared with K's Q), although we are currently stuck in *Golden Apple*, at the ghostly shadow."

Thanks, Mike! As a bonus then, try turning off the lamp when you see the shadowy form — you never know, he might not see you then!

Don Cook, of Leeds, is trying to rescue the Princess with a "jewelled weapon" — that's the diamond spear, Don, which you'll need to kill the eagle. But I won't spoil your fun and tell you where it is (not this week, anyway). And rescuing the Princess is not, as in so many other adventures, the end of the matter, being only a little further on from the Young's position.

Finally, Simon Clark, of Watford, is also having trouble with that pesky Princess, in another location, the water-logged dungeon, in which he keeps getting drowned. You are going to have to do a bit of work, Simon, in translating those symbols that you see. Then try saying the word that you come up with. It's a nonsense word, in the same vein as plug and Y2 and others that crop up in various classic Adventures: they all have one function — magically transport the player from one place to another. We'll return to good old *Knight's Quest* at a later date — now on with the HHOF. The first name this week is: David Bead, with a score of 71% after weeks of toiling (just like the rest of us!) Simon Field of Wokingham — and thanks very much for the map, which I once, rashly I admit, said was near impossible to draw. Well, I did say "near", Simon!



Sarah and Simon Drury, and their father Trevor. I'm glad to see you have so much fun playing it, even after completing it (one of the things that makes this adventure so enjoyable and worthwhile) — I hope you have as much fun with *Valhalla*.

O Gardarsson, from Reykjavik in Iceland. He has also completed Artie's A,B,C and D and is now working through E, *Golden Apple*. Other adventures you might like to look at, Mr Gardarsson, are the *Mysterious Adventures* from Channel 8, which are very like the Scott Adams series, also available now for the Spectrum.

Thomas Turnbull, of Ashington, on his CBM 64, with 85% and 77.5%. Thomas has seen the bard hit the dragon with his bow, and stab it with his arrow! More HHOF another week!

Most of you will, by now, have heard of *The Quill*. This is an adventure creation program from Gilssoft, available for the Spectrum, and soon for the Commodore 64.

When I first mentioned the program, some months ago, I expressed the hope that it would free many people from the worry of coding their adventures, and allow full reign to their imagination in composing worthwhile adventures. I'm glad to see that this has happened!

*Denis through the Drinking Glass* was the first *Quill'd* program I saw, and this adventure, written in witty verse, is, of course, about the first man of the land, Mark Thatcher's father. The follow up — just about with us, and is called *The Tebbit* (that's one software author who won't be getting his MBE in the next Honour's List!).

The second tape that I came across was *Mindbender*, and this one I also enjoyed a great deal. It has since been taken over, for marketing purposes, by Gilssoft themselves, and features in their new Gold Collection of *Quill'd* adventures. Other titles include *Barsak the Dwarf*, *Africa Gardens*, *Spy-plane* and *Diamond Trail*.

*Quill'd* adventures all tend to have the same feel — they are text, with a similar layout and responses. And if you answer 'No' to the inevitable "Play Again?", the program says "Bye" and self-destructs on the next keypress. I must admit that this does not worry me in the slightest — I am more interested in the author's imagination in setting up novel situations. And, being freed from the yoke of coding his adventure, the author can use *The Quill'd* to full advantage.

Several tapes have been sent to me in recent weeks from proud adventure-writers, using Gilssoft's *Quill*.

The first one out of the bag (and there is no hidden meaning to the order in which I tackle these) is *The Lost Gnomes*, merely the first in a series of Eric Bean adventures. Written by one C K Bozicek. It concerns a wily gnome called, you guessed it — Eric Bean. That's you, the player, and your task is to get all your friends and the stolen treasure back to your home.

A sample vocabulary is given in the on-screen instructions before the game begins (a good point this), and the input during play follows the usual *Quill'd* format, of verb followed by a noun (although the program will make a stab at recognising longer sentences), and all the usual commands are recognised (*Get Ferret*, *Drop Rock* and so on — whoops, a couple of free clues there). There are some 130-odd locations, which seems pretty good value, as the puzzles are nice and tough. A charming adventure which will prove really entertaining for the adventure fan.

ERIC BEAN ADVENTURES  
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More *Quill'd* adventures next week.

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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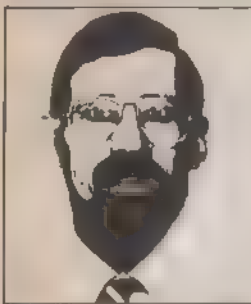
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## PHONE MODEM

H. Willis of Kingswood, Basil-don, writes:

**Q** I have a Dragon 32, and I have heard about phone modems and acoustic couplers. I would like to know what they are and are they available for my Dragon? If so, what could I then do with it?

**A** There are two main types of modem: one plugs directly into the telephone system, and is often called a phone modem (or hardwired modem) and the other fits over the telephone handset and is normally referred to as an acoustic coupler.

Various modems are available for the Dragon 32; Tandatn and Prism are two manufacturers who provide suitable equipment. If you connect your Dragon up to a modem this will allow you to make use of services such as Prestel, but not yet Micronet.

## LOGO GRAPHICS

J. Maniacura of Rose Hill, Mauritius, writes:

**Q** I recently acquired a 48K Spectrum and I am really delighted with it. However I have been wondering about the logo graphics on the introduction cassette. I know it is in machine code but the programming manual has only a short chapter on m/c. Can you recommend a good book on machine code programming and the address of the supplier?

Last week a friend coming from England brought me *Jet-pac*. I have really enjoyed playing this and I have scored 18,750 up until now. However I

do find it awkward to control it from the keyboard so I would like to have some information on joysticks and their interfaces. Your opinion will be much appreciated.

**A** *Spectrum Machine Language for the Absolute Beginner*, written by William Tong and published by Melbourne House, is one of the better introductory books on machine code. Melbourne House can be contacted at: Church Yard, Tring, Hertfordshire, England.

As far as joysticks are concerned there are a great many on the market suitable for the Sinclair Spectrum. If you want one that will be suitable for any game then you should buy one of the "programmable" joystick such as the one produced by Cambridge Computing. They can be contacted at: 1, Ditton Walk, Cambridge, England.

## STEP BY STEP ANSWER

J. Lewis of Spalding, Lines writes:

**Q** Please help! I recently purchased a Sinclair Spectrum 48K and cannot get a program onto tape. I have done what I think is correct according to the instruction manual. The only time it seemed to work the blue/yellow lines, etc, appeared plus the O.K. signal, but when I rewound the tape and did Load ... etc, the program was lost. It may only be a minor misunderstanding of instructions but I am finding it frustrating. Have you any simple step by step instructions?

**A** You should connect up your cassette recorder to the Spectrum as normal, ie, ear to ear and mic to mic, and then pull out the plug from your cassette ear socket.

Now having typed in your program, type: Save "name" (and press Enter) and the STARTAPE message should appear. Now press Record & Play on your recorder, wait for about 10 seconds (until the header has fed through) and then press any key on the keyboard (except space). You should now get the flashing lines etc, and then the O.K.

message. Reconnect the ear lead and rewind the tape. Now use: Verify "name" and try to read what has been written, without losing the program stored in memory. If this does not work then try repeating the above, but with the leads switched around on Save, ie ear from the Spectrum to mic on the recorder and mic on the Spectrum loose. The leads should be as normal on Load or Verify. If this still doesn't work — try borrowing another cassette recorder!

## TWO BYTES MISSING

T Multon, 23 Penn Drive, Denham Green, Bucks, UB9 5JP, writes:

**Q** I have a Commodore Vic 20 and when I switch it on I get the expected '3583 Bytes Free' statement on the screen. But if I type '?Free(0)' I receive the answer '3581'. Could you tell me if there is something wrong with my Vic, or if not, why there are two bytes less than is at first stated?

**A** There is nothing wrong with your Vic. The missing two bytes have been used by the '?Free(0)' command.

Anyway, what's two bytes between friends?

## NAMES IN ORDER

W. Grimes of Dagenham, Essex, writes:

**Q** I have a Sinclair ZX81 and require a program which will sort out names in alphabetical order. There is a program in the Sinclair handbook but this only sorts two strings and I can do this without a computer. Can you provide me with a program which when I enter a list of names will display them on the screen in alphabetical order?

**A** The listing below will work up to 100 names, each of up to 16 characters in length:

```
10 DIM AS (100,16)
20 LET N=1
30 PRINT "INPUT NAME OR 'Q' TO END"
40 INPUT AS (N)
50 IF AS (N) = "Q" THEN LET N=-1
GO TO 70
60 LET N=N+1 GO TO 40
70 IF N=0 THEN STOP
80 FOR I=1 TO N-1
90 IF AS (I)-AS (I+1)
THEN LET HS=AS (I):
LET AS (I)=AS (I+1):
LET AS (I+1)=HS
100 NEXT I
110 FOR I=1 TO N PRINT AS (I)
NEXT I
```

Lines 20 to 60 store the names input into the array AS.

Lines 80 to 100 sort the array. Line 110 prints the array.

## VOICE PROBLEMS

L. Moran of Crumlin, Dublin writes:

**Q** I own a Dragon 32 computer and am having terrible problems with the Computavoice program. I wonder if the Dragon users amongst your readers would send in a list of the words or sentences that they have made this program say. Why don't you have a page every week devoted to Microtips for all micros? By the way, how do I get hold of British stamps so that I can enclose s.a.e.'s to reply to classified ads in your magazine?

**A** Well, all you talkative Dragon owners? What's all this about a page for micro tips? We've got a whole magazine devoted to that subject at the moment.

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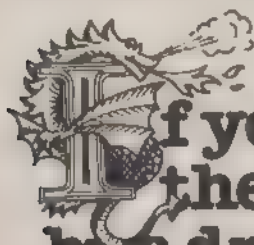
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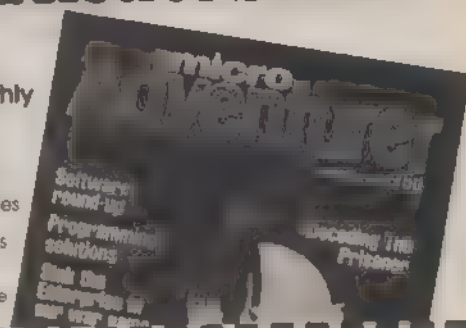
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351827

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30	LOOP; LD	A, (HL)
40	XOR	# FF
50	LD	(HL), A
60	DEC	BC
70	INC	HL
80	LD	A, B
90	OR	C
100	JR	NZ, LOOP
110	RET	

*If you can understand this we would  
be interested to see any games you  
have written!*

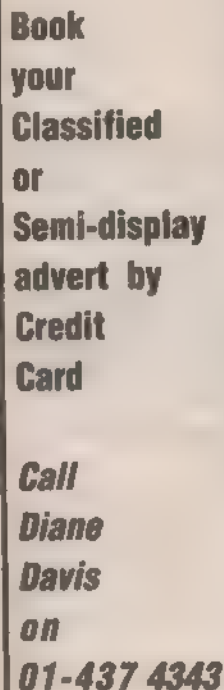
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**SIMON'S BASIC** for Commodore 64, £35 ono. Tel: 01-881 2525 after 7pm. **CB FIDELITY 2000** and all accessories. Sell for £50 or will swap for hardware for CBM 64, and games will pay for originals. Tel: 01-958 8643.

**ORIC 48K** Casselles for sale. Chess, Zodiac, Oric Fight, £3 each or 3 for £8. 4 Lorraine House, Acle Lane, Wallington, Surrey, SM6 7HX.

**SPECTRUM KEMPSTON** Joystick with interface. New at Christmas, unwanted gift £19. Software Omnetron 48K £4.50. Tel: 0483 39660.

**WALTERS MICROSYSTEMS** printer model WM2000 and screen dump programme. Unused. Recommended for use with BBC Micro. £350 ono. Phone 021 458 3837 evenings only.

**TRS-80 COMPUTER 18K**. Only 5 months old. Complete with 2 games and manuals, etc. Cost? £100 ono. Tel: 0474 58144 evenings only. Ask for Ian. **LIGHT PEN** for any issue or memory Spectrum includes interface and software to run. Cost? £20-£25 ono or exchange for software. Tel: 0474 51668. Ask for Ian, evenings.

**ORIC 148K** and software, worth £70. Also book cost £220. Sell for £90. Tel: Stafford (0785) 211445 after 4pm.

**JUPITER ACE FORTH** computer with video interface, £45. 9in b/w video monitor, £35. Both for £75. Tel: Guildford 573134.

**MICRODRIVE**, 48K Spectrum, interface I Software Chess, 3D, Assembler, Disassembler also Eprom board with monitor. Microdrive and software as new, £180. Tel: Watford 23570 evenings.

**LYNX 48K** plus £35 software, £175 ono. Help, Invalent! Tel: Windsor 67764.

**ORIC 148K**. Still under guarantee and good condition plus £100 of s/w. £130. Tel: 0572 3183.

**SPECTRUM S/W** for sale. Many top titles, all at knocked down prices. Towcester 51202.

**JET PAC, COOKIE**, Trans Am, Airl Attack, £18. Hobbit Valhalla, Black Crystal £20. Tel: Notts 256062.

**FULLER MASTER UNIT** for sale £45 or best offer. Luke Roberts, 90 Oxford Gardens, London W10. Tel: 01-860 1276 and ask for Luke (after 6pm).

**SPEECH SYNTHESIZER** for Oric 1, £30. Also 150 plus computer mags. Offers around £257. Also 30 x 2708 Eproms and 15 x CPU's/Periphs inc 6802/6821 (all used) offers £257. Andy 0602 81876 after 5pm.

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**VALHALLA**, Lunar Jetman, Airc Ace, Zoom, Fifth, ETX, Train Game and other originals. Swap or sell. Send list to: Antonio Sole, Flat 3, Carrick Court, Port Mary, Isle of Man.

**FOR SALE OR SWAP** over 100 Spectrum titles, also wanted Jetset Willy to buy or swap. For further details send SAE to Simon, 9 Colton Close, Arnold, Nottingham NG5 6FL.

**ORIC 148K**, 10 months old, plus £70 of software and 3 books and manual worth £220. Sell for £140. Tel: 061 633 1341.

**SHARP MZ80A** includes tape deck and monitor. Hardly used. Boxed with manuals and £75 worth of software for only £380. Uckfield, Sussex. Tel: Uckfield 2097.

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**CASED PSUS 5V20A**, dual 15v5A. ABS computer cases; built 16K dynamic Ram board; unused 6821, 6522,

## Wanted

**SPECTRUM** games to swap or sell including many titles. Call: 01-937 1811. Robert.

**DRAGON PROGRAMS** to swap. Phone 04626 5521 after 4 pm.

**SWAP SPECTRUM SOFTWARE**. Many new titles including Pogo, Hung, Trashman, Pedro. Call John after 6 pm on 01-478 8884.

**SWAP CBM 64** "Lord of Time" adventure for any other Level 9 or Digital Fantasy Adventures. Will sell (£6). Also swap/sell Siren City (£5), O-Level Physics (£5). Tel: (2199) 78159 after 4 pm.

**SWAP CHESS CHALLENGER** voice computer for any 32 or 48K computer and player. Tel: 01-508 7096.

**WANTED:** Real to real, offers around £50. Ring 699 5354 after 4 pm.

**WANTED:** 48K Spectrum or Dragon 32 desperately as little software as possible. No tape units. Willing to pay up to £30. If interested phone Ammanford 5644.

**VIC 20** games to swap, titles include Avdy, Asteroids, Arcadia and lots more. Tel: (0281) 28554 after 5 pm.

**ORIGINAL** software wanted. Send de-

tails to Tony, 23 Egerton Road, South Chorlton, M21 1YP. If you send tapes you must accept my price, none returned. Will give fair price!

**SWAP ELECTRON SOFTWARE**. Phone Harpenden (05827) 5232. After 5 pm. Ask for Ian.

**ZX-80** Wanted. If still in cupboard, send proposition to A Betz Chemlin du Moulin 38, B-1328 Olsin, Belgium. State if computer still working, postage paid.

**SWAP THE QUILL** adventure designer for scrabble or HVRG. Telephone, 01-556 1874 anytime.

## Diary

Event	Venue	Dates	Admission	Organisers
Midland Computer Fair	National Exhibition Centre Birmingham B40	May 4-6 10.00am-6.00pm May 7 10.00am-5.00pm	£2.50 adults £1.50 children	Reed Exhibitions, Surrey House, Throby Way, Sutton, Surrey 01-643 8040
Unslade Middle School Fair	Unslade Middle School, Mentmore Road, Leighton Buzzard	May 6 11.00am-4.00pm	60p	Unslade Middle School, Leighton Buzzard (0525) 381664
Walthamstow 84	Main Exhibition Hall, Waltham Forest Technical College, Forest Road, London E17	May 19 10.00am-5.00pm	£1.00	Waltham Forest Technical College 01-654 5039
Apple 84	Fulcom Centre, Slough	May 24-25 10.30am-5.30pm May 26 10.30am-4.30pm	£2.00 on door (free tickets in advance from organisers)	Database Publications, 68 Chester Road, Hazel Grove, Stockport 061-456 8383
5th International Commodore Computer Show	Novotel, Hammersmith, London	June 7-8 10.00am-6.00pm June 9 9.00am-5.00pm	£2.00 adults £1.00 children £3.00 family ticket	Granard Communications, 4 Balmores St, London W11 01-930 6711
The Computer Fair	Half D Earle's Court, London	June 14 10.00am-6.00pm (trade and press only) June 15-16 10.00am-6.00pm June 17 10.00am-5.00pm	£3.00 adults £2.00 children & OAPs	Reed Exhibitions, Surrey House, Throby Way, Sutton, Surrey 01-643 8040
Micro Trade 84 (Trade only)	Barbican, London	July 4-5 10.00am-6.00pm	Free	Montbault Ltd, 11 Manchester Sq, London W1 01-486 1951
Electron and BBC Micro User Show	Alexandra Palace, London	July 19-21 10.00am-8.00pm July 22 10.00am-4.00pm	£3.00 adults £2.00 children	Database Publications, 68 Chester Rd, Hazel Grove, Stockport 061-456 8383
Personal Computer World Show	Olympia 2, Hammersmith Rd, London	Sept 19-22 10.00am-7.00pm Sept 23 10.00am-5.00pm	Not yet fixed	Montbault Ltd, 11 Manchester Sq, London W1 01-486 1951
5th International Commodore Computer Show	Leeds Exhibition Centre, Queens Hall, Leeds	Sept 27-28 10.00am-6.00pm Sept 29 9.00am-5.00pm	£2.00 adults £1.00 children £3.00 family ticket	Granard Communications, 4 Balmores St, London W11 01-930 6711
Computer Graphics 84 (over 18s only)	Wembley Conference Centre, London	Oct 9-10 10.00am-6.00pm Oct 11 10.00am-4.30pm	£5.00	Online Conferencos, Pinner Green House, Ash Hill Drive, Pinner, Middlesex 01-868 4466
ZX Fair	Bolton Sports Centre, Bolton, Lancashire	May 12 10.00am-5.00pm	75p adults 50p children	Northern Premier Exhibitions, 18, South Parade, Pudsey, West Yorkshire 0532 552854



## FLIGHT AREA

*Battle Flight* is a flight simulation program for the Oric and Atmos—one of very few for the machine. It looks very sophisticated including four different kinds of graphics display — the airfield, flight area map, 3D of runway on landing and views of approaching aircraft.

The big problem with flight simulation programs that attempt to genuinely simulate a real aeroplane is the large number of controls required, which in the case of machines like the Oric and the Spectrum means a vast number of different keys to press.

This fact, in conjunction with the natural complexity of flying a plane, means that all early attempts at computer flight are likely to result in major crashes.

Still, it's worth persevering if only for the genuine pride you'll feel if you manage to fly a few miles. Up, up and away.

**Program** *Battle Flight*  
**Price** £4.95  
**Micro** Oric/Atmos  
**Supplier** Stour Computing  
16 Old Bridge  
Road  
Bournemouth

## PAINTED

Through the long passing years echoes of *Amidar* still abound — this time it's a version for the BBC B and is retitled *Crazy Tracer*.

For those who don't know the game it involves moving a paint wheel around a screen trying to complete the outlines of squares to win points. You are chased by the inevitable bugs that object to your having this harmless good time.

The second screen — awarded if you paint in all the rectangles on the first, continues the theme but this time you must paint in the rectangles in one go otherwise you run out of paint and have to go back for more.

It is, of course, totally unoriginal but therefore retains the additive power of the authen-

tic version. I'm surprised Acornsoft are not afraid of being sued.

**Program** *Crazy Tracer*  
**Price** £9.95  
**Micro** BBC B  
**Supplier** Acornsoft  
46 Market Hill  
Cambridge  
CB2 3NJ

## FOLLOW SUIT

*Bridge Player II* is a souped up version of *Bridge Player I* (surprise surprise) which is the only Bridge playing program I've seen on any micro.

My personal knowledge of Bridge amounts to the fact that in some places it's a bit like whist which I learnt on my grandmothers knee — I never got any further with Bridge because I didn't have a suit.

Nevertheless after a full and frank discussion with several of my colleagues who do have suits I can offer you their comments.



These seem to be extremely favourable: "the fact that the computer completely reshuffles for each hand is a big plus point" "very good but bids conservatively". It knows something called Acol and won't allow you to make stupid moves. A must for Spectrum owning Bridge players everywhere.

**Program** *Bridge Player II*  
**Price** £8.95  
**Micro** Spectrum  
**Supplier** C.P. Software  
2 Glebe Road  
Uxbridge  
Middlesex UB8 2RD

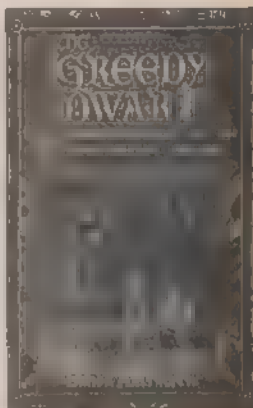
## Pick of the week

*The Greedy Dwarf* is a BBC Text adventure from Goldstar which features, among other things, the most complex language analysis I've seen since the *Hobbit*.

Aside from the usual Verb Noun combinations — Take Rabbit, Kill Frog etc, the program includes a wide range of adverbs and adjectives necessary to master the adventure, example sentences include 'Carefully drop the flask of liquid, please' and 'shout Help' (which is what I usually end up doing.)

The objective of the adventure is to recover the king's stolen gems from the dwarf Arfa who stole them. This means venturing into a maze of catacombs. The program to make me suspect we'll be hearing a lot more of this program.

## SHOUT HELP!



**Program** *The Greedy Dwarf*  
**Price** £9.95  
**Micro** BBC  
**Supplier** Darling Kinderley  
Software  
1-2 Henrietta Street  
London WC2E 8PS

For sports fans it should be a lot of fun. A Commodore 64 version is expected.

## GOLD MEDAL

*Olympics 83* is a beautifully packaged program for the Spectrum 48K from Storm Software. It is not an arcade game but rather a vast interactive database of Olympic facts and figures.

The package consists of three parts, two cassettes and a substantial booklet. The idea is that you can use the database to analyse various aspects of past performance in the games — the program includes, for example, every gold medal winner since 1896.

For such a specialised package the commands available for use of the data are very complex indeed — almost a language eg. EVENT = DISCUS > TYPE = MEN > HISTORY means find all the results in the men's Discus events.

Other commands will produce a pictorial representation — of medals won by each country for example. The second tape allows for very much the same thing but allows you to enter the results as they happen in this year's games.

**Program** *Olympics 84*  
**Price** £14.95  
**Micro** Spectrum  
**Supplier** Storm Software  
Winchester House  
Sherborne  
Dorset DT9 4DL

## MARAUDERS

If I knew what distinguished a great game from a lousy one I'd make a fortune. *Fire Ant* is basically a dodge obstacles maze type game but far from being tedious and boring it's excellent.

You are an ant (a harsh judgement perhaps, but there you are) and your one task in life is to rescue the Queen ant from an army of scorpions (antist?). This involves finding your way through a series of mazes and munching through walls.

Obviously one element in the game is avoiding marauding scorpions, but what makes the game particularly successful is the way — like *Manic Miner*, some of the screens require some logical thought to

# New Releases

mastered it isn't merely speed of reactions.

Technically there's nothing amazing here but if the game is enjoyable and addictive, which it is, this is hardly relevant.

**Program** *Fire Ant*  
**Price** £7.95  
**Micro** *Commodore 64*  
**Supplier** *Mugul Communications*  
90 Regent Street  
London W1R 5PT

## ANIMATED

*Matrix* Jeff Minter's follow up to *Gridrunner* is now available, via Llamasoft's arrangement with Salamander, for the Spectrum.

Salamander have produced versions of several of Jeff's games and whilst all have retained the high speed appeal of the originals none have been particularly well programmed — were it not for the sheer brilliance of the game design they would look absurd placed against an *Ultimate* offering.



With *Matrix* things are looking up. The speed of the original is maintained but here Salamander seem to have done an especially good programming job — characters are animated and the game has 20 levels of varied but intense action.

**Program** *Matrix*  
**Price** £6.95  
**Micro** *Spectrum*  
**Supplier** *Salamander Software*  
17 Norfolk Road  
Brighton  
East Sussex  
BN1 3AA

## NEW OWNERS

Recently Prentice Hall released a tape called *100 programs for the Spectrum* — now they have done the same for the Electron.

In the Electron's case there may be a greater need for such a package — it's a much more recent machine than the Spectrum and consequently has a newer ownership, more likely to be looking for a lot of programs quickly.

As I have said before, 100 programs for just over £10 means that none of the programs are marvellous, although some of them could be used as building blocks for larger, more substantial programs.

**Program** *100 Programs for the Acorn Electron*  
**Price** £11.50  
**Micro** *Electron*  
**Supplier** *Prentice-Hall*  
66 Wood Lane End  
Hemel Hempstead  
Herts  
HP2 4RG

## HIDEOUS DETAIL

*Maziacs*, a game which was considered a classic on the ZX81 is now available on the Commodore 64. It is closely related to the Spectrum version that was released last year — being issued by the same company DK Tronics.

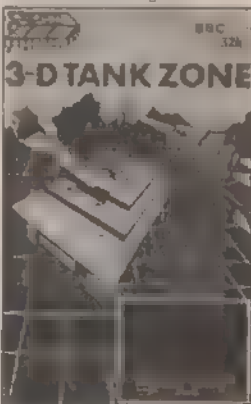
The idea of the game, which in many ways anticipated the *Atic Atac* style graphic adventures that are now so familiar, is to fight your way through a maze to a treasure chest. Hindering your way is an army of strange spidery creatures portrayed in sickeningly hideous detail, you can fight them if you have a sword and if you have the strength (did you find enough food?).

The other big problem is that you only get a brief indication of whereabouts the gold is hidden and have to memorise as much of the map as possible — the exception to this being provided by wretched prisoners who are strung up along the route, who can point you in the right direction.

**Program** *Maziacs*  
**Price** £6.95  
**Micro** *Commodore 64*  
**Supplier** *DK Tronics*  
Unit 6, Shire Hill  
Industrial Estate  
Saffron Walden  
Essex CB11 3AQ

## EERIE APPEAL

*Battlezone* was one of the classic arcade games. It used three dimensional line graphics in a tank versus tank game of loc-



tanks (done for memory reasons) actually gave the whole game an eerie appeal.

*3D Tankzone* for the BBC does justice to the original, using high resolution wire graphics to create the same effects. That said, the structure of the game is pretty simple — shoot anything that moves but don't get shot.

**Program** *3D Tankzone*  
**Price** £8.95  
**Micro** *BBC*  
**Supplier** *Dynabyte Software*  
31 Topcliffe Mews  
Wide Lane  
Morley  
Yorks

## SUBTRACTION

Mirrorsoft have issued the next batch of original software following a well received initial batch. The two games *Count with Oliver* and *Look Sharp* are both educational aimed at the younger age ranges.

*Count with Oliver* teaches counting combined with colour recognition — the first part,

entitled *Toyshop* and teaches subtraction in the second section — *Lollipop* — as Oliver gradually stuffs himself (growing visibly fatter all the time.)

Although there is nothing very staggering here in terms of approach, what Mirrorsoft are doing consistently right is using the Spectrum's graphics to the full.

**Program** *Count With Oliver*  
**Price** £7.95  
**Micro** *Spectrum*  
**Supplier** *Mirrorsoft*  
Holborn Circus  
London EC1P 1DQ

## ROLE PLAYING

*Sunken City* is a graphic adventure for the Dragon 32. It is single key press, role playing, in style with your task within the game being to discover a legendary *Sunken City*.



The game appears to be in Basic with only around five different commands available, which probably makes the game unsophisticated by current standards. But the proof is in the pudding...

**Program** *Sunken City*  
**Price** £7.95  
**Micro** *Dragon 32*  
**Supplier** *Silk Software*  
19 Sancroft Street  
London SE11 5UG

*New Releases* is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: *New Releases*, Popular Computing Weekly, 12-13 Little Newport Street, WC2R 3LD.



## Spectrum\*

- (2) Jet Set Willy (Software Projects)  
 (2) (1) Alcatraz (Ultimate)  
 (3) Chequered Flag (Pison)  
 (4) Hunchback (Ocean)  
 (5) Flight Simulation (Pison)  
 (6) Scuba Dive (Dunell)  
 (7) Pogo (Ocean)  
 (8) Cyrus 13 Chess (Intelligent)  
 (9) Lunar Jetman (Ultimate)  
 (10) Alchemist (Image)

\*All 48K except where noted. † 16K.  
 (Figures compiled by WH Smith and Son, London)

## Z80†

- (1) (2) Fantasy Games (Pison)  
 (2) Space Raiders (Pison)  
 (3) (1) Moonship (Softbyte)  
 (4) (7) Scramble (Quickolive)  
 (5) (5) Flight Simulation (Pison)  
 (6) (8) Invaders (Quickolive)  
 (7) (8) Space Raiders (Pison)  
 (8) Asteroids (Quickolive)  
 (9) (3) Defender (Quickolive)  
 (10) (1) Chess (Pison)

\* All 16K  
 (Figures compiled by Boots-Websters)

## Vic 20

- (1) (1) Snooker (Visions)  
 (2) (5) Krazy Kong (Interceptor)  
 (3) (2) Flight 015 (Ferranti Development)  
 (4) (1) Submarine Commander (Thom EM)  
 (5) (1) Escape MCP (Rabbit)  
 (6) (9) Carrier Attack (Rabbit)  
 (7) (10) Dumbuster (Rabbit)  
 (8) (9) Jet Pac (Ultimate)  
 (9) (7) Emmet Attack (Commodore)  
 (10) (8) Grid Runner (Lianaso)  
 (11) (4) Mine Madness (Thom EM)

(Figures compiled by Boots-Websters)

## Dragon

- (1) (1) Dragon Chess (Ostet)  
 (2) (3) Hungry Horace (Melbourne House)  
 (3) (4) Chuckle Egg (J&F)  
 (4) (2) Ugh! (Softtek)  
 (5) (5) Pedro (Image)  
 (6) (1) Eighthall (Microdeal)  
 (7) (8) Knagspiel (Beyond)  
 (8) (5) Cuthbert in the Jungle (Microdeal)  
 (9) (7) Up Periscope (Beyond)  
 (10) (1) Frogger (Microdeal)  
 (11) (1) Scramble (Microdeal)

(Figures compiled by Boots-Websters)

## Commodore 64

- (1) (2) Quick Thinking (Microsoft)  
 (2) (3) Caesar the Cat (Microsoft)  
 (3) (1) Minc Miner (Software Projects)  
 (4) (8) Ugh! (Softtek)  
 (5) (4) Hunchback (Ocean)  
 (6) (5) Mr Wimpy (Ocean)  
 (7) (1) Sprites and the Snowman (Commodore)  
 (8) (9) International Football (Commodore)  
 (9) (5) Revenge of the Mutant (Lianaso)  
 (10) (1) Colossus Chess (CDS)  
 \*Rom cartridge  
 (Figures compiled by Boots-Websters)

## SARCASTIC

One of the things kids who own micros often say to justify owning it is that they hope to get a job in computers and their micro will help them learn all about it.

The correct response for the sarcastic and sadistic parent at this point is to say 'Ah it speaks *Cobol* does it' at which point kid looks confused and parents smile self-righteously.

Because you see, *Cobol* is just about the business language at the moment but few micros speak it and learning *Basic* doesn't help much. For those people who are sincere in their intention to get a job in computing *Practical Cobol for Microcomputers* could be just the thing. This book discusses the language and includes a number of practical examples.

As versions for the language do become widely available for micros, this book could prove very useful — *Cobol* is pretty much standardised; consequently most of the programs in the book should work on any version of it.

Book *Practical Cobol for Microcomputers*

Price £6.95

Micro *General*

Supplier *Sigma Technical Press*  
 5 Alton Road  
 Wilmslow  
 Cheshire  
 SK9 5DY

## REFERENCE

Since one of the more sensible things you can do with your BBC is wordprocessing, a book on this subject is a fairly sound idea — hence *Word Processing on the BBC Micro*.

Although the book hardly adds to the various manuals, it does usefully connect all the bits and pieces together. It can do this because it specifically assumes you are using *Wordwise* with an Epson printer — which is probably fairly likely. Thus, for example, you are shown exactly how to usefully implement control characters on the Epson from *Wordwise*. Good for quick reference.

Book *Word processing on the BBC Micro*

Price £5.25

Micro *BBC (+ Wordwise and Epson)*

Supplier *The National Computing Centre*  
 Oxford Road  
 Manchester  
 M1 7ED

## BBC+

- (1) (1) Killer Gortia (Program Power)  
 (2) (4) Chuckie Egg (A&P)  
 (3) (5) Dareside Dennis (Visions)  
 (4) (2) Fortress (Pison)  
 (5) (3) 3D Space Ranger (Microbyte)  
 (6) (1) Dodgy Dealer (Computer Consultants)  
 (7) (1) Dumbusters (Ocean)  
 (8) (1) Mr Wimpy (Visions)  
 (9) (7) Snooker (A&F)  
 (10) (1) Cyclon Attack (A&F)

\* All Model B  
 (Figures compiled by Micro Management, Ipswich 0473 59181)

## Atari

- (1) (1) Zaxxon (Datsoft)  
 (2) (3) Slinky (Cosmo)  
 (3) (1) Warlock (Callisto)  
 (4) (2) Rally Speedway (Adventure International)  
 (5) (6) Sage 4 Voodoo Castle (Adventure International)  
 (6) (1) After Challenge (Cosmo)  
 (7) (1) Savage Pond (Starcade)  
 (8) (9) Sage 5 The Count (Adventure International)  
 (9) (8) Enchanter (Infocom)  
 (10) (1) Time Warp (English Software)  
 \*Cartridge † 32K disc ‡ 48K disc  
 (Figures compiled by Callisto Computers, Birmingham 021-832 6458)

## Books

- (1) (1) Disc Systems for the BBC Micro, Sinclair (Granada)  
 (2) (1) Commodore 64 Programmers Reference Guide, Commodore (Commodore)  
 (3) (1) Mastering Machine Codes on the ZX Spectrum, Baker (Interface)  
 (4) (1) Interfacing Projects for the BBC Micro, Smith (Addison Wesley)  
 (5) (1) Child's Guide to the BBC Micro, Dewhurst (Cambridge)  
 (6) (2) Mastering the Commodore 64, Jones and Carpenter (Harcourt)  
 (7) (8) 68000 Assembly Language Programming, Kane and Livenesshal (Osborne)  
 (8) (7) Advanced Graphics with the BBC Microcomputer, Angell and Jones (Macmillan)  
 (9) (5) Introducing Logo, Allen (Granada)  
 (10) (1) Oil Companion, Allen (Pitman)  
 (Figures compiled by Watford Technical Books, Watford (0623) 23324 Preorder 28944)  
 (Last week's position in brackets)

## This Week

Program	Type	Micro	Price	Supplier
Demolator	Arc	BBC	£6.95	Visions
Bedbugs	Arc	BBC/Electron	£6.95	Optima
Boxing/Galactica	Arc	Commodore 64	£5.50	I.G. Programs
Mastering the Commodore	Ed	Commodore 64	£9.95	Wiley
Multisound Synthesizer	Ut	Commodore 64	£14.99	Romik
Pollit	Arc	Commodore 64	£6.99	Romik
Spitall	Arc	Commodore 64	£8.50	Incentive
Turtle Jump	Arc	Commodore 64	£8.99	Romik
Grunberg Spanish	Ed	Dragon	£12.95	Dragon Data
S 22	Ut	Dragon	£39.95	Ashby
Stock Control	Ut	Dragon 32	£19.95	Aphros
CBS Forth	Ut	Lynx	£19.95	Cubsoft
Revenge of Drosoph	Arc	Nascom	£8.00	G Rowland
Atlantis	Arc	Spectrum	£4.95	Oddysey
Basic +	Ut	Spectrum	£12.95	Prosign
Crazy	Arc	Spectrum	£3.50	Oddysey
Crazier	Ad	Spectrum	£3.50	Oddysey
Friendly Face	Ut	Spectrum	£8.95	Monitor
Golden Quest	Arc	Spectrum	£7.50	Marshallgate
It's the Woolf	Arc	Spectrum	£5.95	Crystal
Mugsy	Ad	Spectrum	£8.95	Melbourne House
Rubik	S	Spectrum	£2.00	Cheap Games
Safari	Ad	Spectrum	£3.50	Oddysey
Stronghold of Lori	Ad	Spectrum	£3.50	Oddysey
Temple of Vran	Ad	Spectrum	£7.50	Incentive

The Fall of Rome	B	Spectrum	£5.99	Argus
Time Search	Ad	Spectrum	£5.95	Millenium
Tomb of Raws	Ad	Spectrum	£4.95	Flashing Swords
Tradewind	Ad	Spectrum	£5.00	WD Software
Vari Calc	Ut	Spectrum	£4.50	Devilla
Chemistry A Level	Ed	Spectrum/BBC	£5.95	Calisto
Physics A Level	Ed	Spectrum/BBC	£5.95	Calisto
Horse Racing	S	T199/48	£9.95	Flavel
Aztec Gold	Ad	Texas TI 99/4a	£8.95	Lizard
Lionel and the Lad	Arc	Texas TI 99/4a	£7.95	Intrigue
Menia	Ad	Texas TI 99/4a	£5.95	Intrigue
Postman's Knock	Arc	Texas TI 99/4a	£4.95	Lizard
20 Games	Arc	ZX81	£3.95	Thomson

Key: Ad — adventure/Arc — arcade/Ed — education/  
 S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.





## The outer limits

"The message is being repeated over and over. I'll put it through the cabins' speaker."

"... May day, may day. Is there anybody out there? This is the Forts of Falcon. We are under attack, in the name of the Emperor help us. Forts One and Three are already down, we have suffered severe casualties, they are closing for the kill..." At this point the message ended with a rising scream and the sound of air rushing into space. As the poor man died he must have hit the repeat message control.

"List our options, Neep."

"We are marooned in this sector, no habitable planets that we could reach within your life time travelling at sublight. You have supplies for approximately one year on board the Hawk. Your only hope is to board Fort two and find the parts and expertise to fix the Hawk. There is, of course, one small problem; the alien fleet."

"The chances of destroying the fleet?"

"Small, but not as bad as you may think. I have set up a communication link with the central Pseudo Conscious Intelligent constructs surviving on Forts two and three. They are both badly impaired, but should be able to manoeuvre the Forts to give us some protection."

"Well Neep, the sooner we get this done, the happier I'll be. It's been good knowing you!" I turned and waved at Neep, one of his arms waved back. With the Gravity Inertia Compensation damaged, I felt my body thrown violently back into the seat as Neep accelerated the ship towards the Forts of Falcon. I scanned the monitor screens in front of me—as I watched the first wave of Alien vessels appear at the top of the screen.

"Put audio on online, Neep. Anything that might help predict their movements."

"There isn't much, but I am picking up a fair

amount of radio waves. Converting to sound, Aereus." The cabin was filled with the unearthly noise being generated by the monsters.

I fired a shot up past Fort Two. The Caloric Fire travelled upward into space, and a satisfying buzz came through the speakers as energy burnt off it. The display clearly showed the path of the fire—all the systems seemed to be working.

Suddenly a curling cord of energy dropped from one of the aliens and blossomed into a feverish explosion on Fort three.

"Final systems check, Neep. Control to me on my mark. Acknowledge."

"Systems functional, safety devices overridden, overall ship status Amber 76. Control on your mark."

"Counting: Five-Four-Three-Two-One-Mark; Control to me." I grasped the joystick more firmly and sent the ship soaring across the inky blackness. The aliens dropped steadily closer, the atmosphere in the ship warmed, the fire button became hot to the touch, Neep whispered warnings and information into my ear. Outside it looked as though a sun was being born, with deadly bands of energy criss-crossing in front of distant stars.

The aliens went down, one by one in neat underwater explosions. A command saucer appeared above the bulk of the alien fleet, glowing ultraviolet blue. Swinging the Hawk round, I fired. The saucer dodged, but too late. A searing violet flame ripped across the fleet and four of the alien craft dissolved.

With the Hawk pushed beyond its limits by Neep we were able to run around the alien ships, and dodge their deadly coils of energy which sought to capture and destroy us. The Forts of Falcon were taking a terrible toll, I only prayed that no one was near the outer skins.

As the battle progressed, I felt myself becoming more and more detached, as though there were two of me; one fighting, the other watching as though the whole battle were just part of a space opera on 3D tv. The watching part of me saw one of the alien craft shimmer and distort, mutating through lethal unstable forms. As it mutated deadly energies flew from it; the watcher told the fighter, who swung the Hawk round and fired.

The watcher saw the final alien explode, saw the fighters' hands fall from the control console. The watcher and the fighter closed their eyes.

"Control to you Neep. How's the ship?"

"Magnificent Aereus, we still live. The ship is in overall status Red 43. We have a few hours to secure the life support systems. Imperative we approach the forts now."

Mark Eyles

## Stage fright

### Puzzle No 105

The Muddlecombe Players amateur dramatics scenery department has just finished an extra couple of items needed for its next production. These are a wooden rostrum and a plain wall 'flat'.

The rostrum consisted of a wooden framework, cuboid in shape, with each of the six rectangular faces covered with plywood. The 'flat' was just a plain rectangular structure, one and a half times as high as it was wide.



When these pieces were being painted it took the same quantity of paint to cover both items, which was not surprising, as the area of the six rectangular faces of the cuboid were together equal to the area of the one face of the 'flat'.

If the height, width and length of the rostrum and the height and width of the 'flat' were all an exact number of feet with no two dimensions being the same, what was the smallest size possible for both items?

### Solution to Puzzle No 100

The problem relates to finding any integral factors of 1111111. The program divides this sum by successive odd numbers until an exact division is found.

```
10 LET D = 320 LET C = 1111111/D 30 IF C = INT C THEN GOTO 60 40 D = D + 2 50 GOTO 20 60 PRINT D.C
```

Both of these numbers represent the two prime factors of 1111111 and so there can be no ambiguity in the answer of 4649 television sets at £239 each.

### Winner of Puzzle No 100

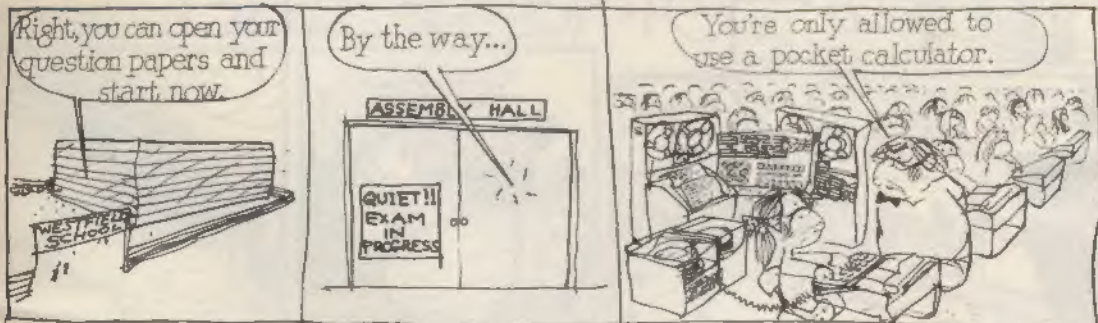
The winner is Graham Maguire, Kepler Street, Seaforth, Liverpool, who receives £10.

### Rules

If the puzzle can be sensibly solved using a computer, then the winner will have included a listing of the program used to find the correct answer.

The closing date for entries to Puzzle No 105 is May 18.

## The Hackers





# AUTOMATA

... but seriously,

**PIMANIA** - the cult adventure that's for real!  
16K ZX81 £5 ☐ BBC 32K £10 ☐ Dragon 32 £10 ☐ Spectrum 48K £10 ☐

**GROUCHO** - the Pimania sequel, Concord-QE2-USA prize  
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**PI-EYED** - the comedy cartoon arcade game, starring  
the PiMan. Free protest disco record. Spectrum 48K £6 ☐

**PI-BALLED** - A triumph of the arcade programmer's art.  
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**MORRIS MEETS THE BIKERS** - exciting arcade fun,  
as seen on TV. Outrageous free doo-wop record. Any Spectrum £8 ☐

**YAKZEE** - Buddy wonderfart game of rock and skiff.  
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**OLYMPIANIA** - He's back! He's going for gold!  
He's sober! Free National Anthem on the flipside. Spectrum 48K £8 ☐

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A SAD BUT  
BUSY DAY AS UNCLE  
CHEZ PI PREPARES TO  
GROUCHO RETURN TO HIS HOMELAND.  
THIS COULD BE A THREE-  
HANKIE JOB, DEPENDING  
HOW MUCH OF YOUR TEA  
YOU SLOP DOWN YOUR FRONT  
WHILST READING...

CRUMBS, GROUCHO  
YOU HAVEN'T HALF  
COLLECTED SOME  
OLD CODSWALLOP!

OKAY - I'LL JUST  
TAKE THE WALLOP,  
YOU CAN KEEP THE  
OLD COPS!



HELLO, PINKY! CAN  
I HAVE YOUR  
AUTOGRAPH?

ERK

I'M NOT GOING WITH YOU  
UNLESS THE PIMAN SIGNS  
MY RIGHT LEG... ABOVE  
THE KNEE!!

LUCKY I HAD  
MY PINKO HANDY!

HEAVENS  
ABOVE!

HEY, I THOUGHT I  
TOLD YOU TO STAY PUT  
UNTIL WE GOT UNDERWAY??!

I'D BETTER NOT WRITE  
THAT!



SOUTHAMPTON DOCKS... AND  
GROUCHO'S BIG SEND OFF...

HELLO, I MUST BE GOING  
I CANNOT STAY, I CAME TO SAY  
I MUST BE GOING...



OH, GROUCHO, IT  
WON'T BE THE SAME  
WITHOUT THAT HAZE OF  
ASPHYXIATING SUGAR  
SMOKE! SOB!

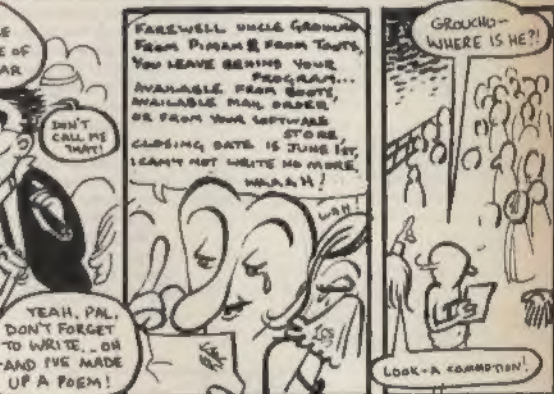
ISN'T  
CALL ME  
THAT!

YEAH, PAL.  
DON'T FORGET  
TO WRITE... OH  
-AND I'VE MADE  
UP A POEM!

FAREWELL UNCLE GROUCHO  
FROM PIMAN'S FRONT TENTS.  
YOU LEAVE BEHIND YOUR  
PROGRAM...  
AVAILABLE FROM BOOKS,  
AVAILABLE MAIL ORDER,  
OR FROM YOUR FAVORITE  
STORE.  
CLOSING DATE IS JUNE 1ST,  
LEARNY NOT WRITE NO MORE,  
WHA, A H!

GROUCHO -  
WHERE IS HE?!

LOOK - A COMEDIAN!



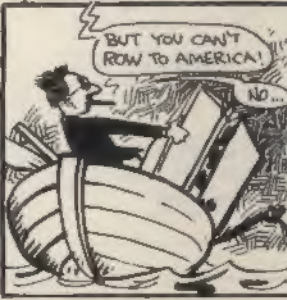
GROUCHO! WHAT ARE YOU  
DOING? WHY AREN'T YOU  
ON THE QE2?

BECAUSE I  
SPENT THE  
FARE!



BUT YOU CAN'T  
ROW TO AMERICA!

NO...



...THAT'S WHY I BROUGHT  
DOROTHY ALONG! BE GOOD!



